CYPERMETHRIN (118)

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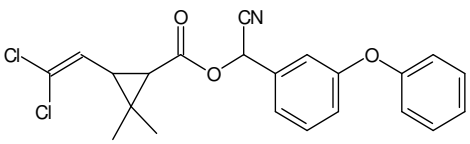
See also monographs on alpha-cypermethrin and zeta-cypermethrin.

EXPLANATION

Cypermethrin was first evaluated by the 1979 JMPR and subsequently evaluated for toxicology and residues a number of times. Cypermethrin was reviewed for toxicology by the 2006 JMPR within the periodic review programme of the CCPR; the review included alpha-cypermethrin and zeta-cypermethrin, which had not previously been considered by the JMPR. The periodic review for residues was scheduled for 2008.

CCPR, at its 39th Session in 2007, noted that three manufacturers would submit residue data to JMPR on cypermethrins (including alpha and zeta cypermethrin) for consideration by the 2008 JMPR. Information on GAP was provided by Australia and Japan. Information on GAP and residue trials studies were supplied by Malaysia and Thailand.

IDENTITY

ISO common name	cypermethrin
Synonyms:	WL43467
IUPAC name (Wood, 2008)	(*RS*)-α-cyano-3-phenoxybenzyl (1*RS*,3*RS*;1*RS*,3*SR*)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate or (*RS*)-α-cyano-3-phenoxybenzyl (1*RS*)-cis-trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate
Chemical Abstracts name (Wood, 2008)	cyano(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate
CAS Number (Wood, 2008)	52315-07-8
CIPAC Number	332
Molecular formula	$C_{22}H_{19}Cl_2NO_3$
Molecular mass	416.3 g/mol
Structural formula	

Comparison with alpha-cypermethrin and zeta-cypermethrin

Isomer	cypermethrin	alpha-cypermethrin	zeta-cypermethrin
1R, cis-R	14	–	3
1S, cis-S	14	–	22
1R, cis-S	11	50	22
1S, cis-R	11	50	3
1R, trans-R	14	–	3
1S, trans-S	14	–	22
1R, trans-S	11	–	22
1S, trans-R	11	–	3

PHYSICAL AND CHEMICAL PROPERTIES

Pure active ingredient

Property	Results	Ref
Description (purity 98.3%, cis:trans 37.6:62.4)	White powder	40/30-D2149 (CYP/C65)
Melting point (purity 98.3%, cis:trans 37.6:62.4)	41.2–47.3 °C	40/30-D2149 (CYP/C65)
Relative density (purity 98.3%, cis:trans 37.6:62.4)	1.30	40/30-D2149 (CYP/C65)
Vapour pressure (purity 99.3%)	6×10^{-7} Pa at 25 °C	CAV002/052563
Solubility in water (purity 98.3%, cis:trans 37.6:62.4)	Below 9 µg/L	40/30-D2149 (CYP/C65)
Solubility in solvents (purity 99.3%) at 20 °C	Methanol: 248 g/L Heptane: 57 g/L	CAV002/052563
Octanol/water partition coefficient (purity 98.3%, cis:trans 37.6:62.4)	log K_{ow} = 5.3 to 5.6 for the four components	40/30-D2149 (CYP/C65)
Hydrolysis rate (radiochem purity 99%) at 5 µg/L in buffers + acetonitrile, duration 28 days. (Half-lives calculated from table of rate constants.)	pH 3, 25 °C, cis, trans < 10% hydrol, 28 days pH 7, 25 °C, cis < 10% hydrol, 28 days pH 7, 25 °C, trans half-life = 136 days pH 11, 25 °C, cis half-life = 38 mins pH 11, 25 °C, trans half-life = 23 mins	Takahashi *et al.* 1985a
Photolysis rate (radiochem purity 98%, cis:trans 40:60) at 4 µg/L in sterile pH 4 buffer at 20 °C for 100 hours.	Estimated half-life 7.1 and 8.9 days (12-h Florida summer sunlight days). Three photolysis products were identified: 3-phenoxybenzoic acid (yield 15%), 3-phenoxybenzaldehyde (yield 3%) and DCVA (yield 18%).	40/35-D2149 CYP/M70
Photolysis in water under natural sunlight, August, Hyogo, Japan.	Photolysis in distilled water[a] cis half-life = 2.3–2.6 days trans half-life = 3.4–3.6 days. Photolysis in river water and sea water cis half-life = 0.6–0.7 days trans half-life = 1.0 days.	Takahashi *et al.* 1985b
Dissociation constant in water	Does not dissociate	

[a]Both isomers were subject to isomerisation of the cyclopropane ring under photolysis conditions, i.e. interconversion of *cis*- and *trans*-isomers. At equilibrium, the *trans* isomer constituted 51–59% of the isomer mixture.

Technical material

Property	Results	Ref
Description	Viscous liquid coloured amber	40/33-D2149 (CYP/C63)

Property	Results		Ref
Solubility in organic solvents at 20 °C (purity 96.5%, cis:trans 41:59)	Ethyl acetate: >2000 g/L of solvent		40/33-D2149 (CYP/C63)
Isomer composition (purity 93.05%)	Cis I: 23.3% Cis II: 16.8% Total cis: 40.1%	Trans I: 35.8% Trans II: 24.1% Total trans: 59.%	1669/023-D1249
Hydrolysis (purity 91%) in sterile aqueous buffers + acetonitrile in the dark, 0.1 mg/L	pH 4, 50 °C pH 7, 25 °C pH 7, 50 °C pH 9, 50 °C [a]	< 10% hydrolysis in 29 days < 10% hydrolysis in 29 days half-life = 4.7 days half-life = 1.9 hours	PR97/003

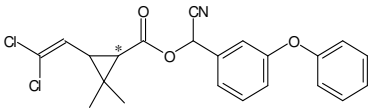
[a]Where hydrolysis occurred, two hydrolysis products occurred in equimolar concentrations: DCVA and 3-phenoxybenzaldehyde.

Formulations

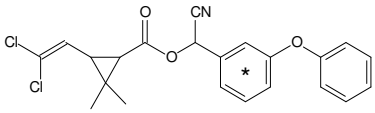
Cypermethrin is available in numerous commercial formulations in many countries. It is available in a range of formulation types: EC, WP, DP, ME and UL. It may be formulated mixed with other pesticides such as chlorpyrifos.

METABOLISM AND ENVIRONMENTAL FATE

Plant metabolism and environmental fate studies used cypermethrin ^{14}C labelled in the cyclopropyl and benzyl ring carbon positions.

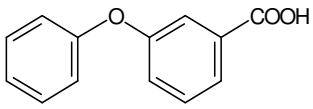
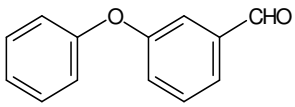
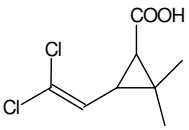
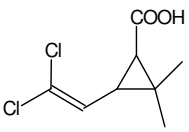
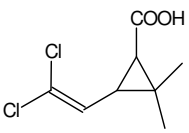


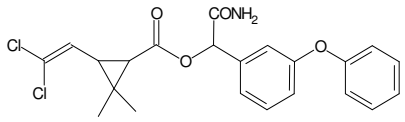
cyclopropyl label



benzyl ring label

Structures and names for metabolites and transformation products are summarised below.

Simple: 3-phenoxybenzoic acid, PBA, mPB acid Systematic: 3-phenoxybenzoic acid CAS number: 3739-38-6	
Simple: 3-phenoxybenzaldehyde, mPB aldehyde Systematic: 3-phenoxybenzaldehyde CAS number: 39515-51-0	
Simple: DCVC acid, DCVA Systematic: 3-(2,2-dichlorovinyl)2,2-dimethylcyclopropanecarboxylic acid CAS number:	
Simple: *cis*-DCVA Systematic: *cis*-3-(2,2-dichlorovinyl)2,2-dimethylcyclopropanecarboxylic acid CAS number: cis: 59042-49-8	
Simple: *trans*-DCVA Systematic: *trans*-3-(2,2-dichlorovinyl)2,2-dimethylcyclopropanecarboxylic acid CAS number: 59042-50-1	

Simple: Cyperamide Systematic: cyclopropanecarboxylic acid, 3-2,2-dichloroethenyl)-2,2-dimethyl-,2-amino-2-oxo-1(-(3-phenoxyphenyl) ethyl ester CAS number:	

Animal metabolism

The Meeting received animal metabolism studies with cypermethrin in rats.

Laboratory animals

The metabolic fate of orally administered cypermethrin in rats and mice was reported by the 2006 JMPR (JMPR, 2006):

> "In laboratory animals, cypermethrin was readily hydrolysed at the ester bond, followed by hydroxylation and conjugation of the cyclopropyl and phenoxybenzyl moieties of the molecule. Urinary metabolites consistent with a similar metabolic pathway in humans were recovered from orally dosed volunteers. The animal data indicated that there is little isomeric interconversion during metabolism of cypermethrin or alpha-cypermethrin."

Livestock

See also alpha-cypermethrin monograph for studies on lactating dairy cows (alpha-cypermethrin) and laying hens (alpha-cypermethrin).

See also zeta-cypermethrin monograph for studies on dairy cows (cypermethrin) and laying hens (cypermethrin).

Plant Metabolism

See also alpha-cypermethrin monograph for studies on cabbage (alpha-cypermethrin) and wheat (alpha-cypermethrin).

See also zeta-cypermethrin monograph for studies on sugar beet (cypermethrin), maize (cypermethrin and zeta-cypermethrin), cotton (cypermethrin), lettuce (cypermethrin) and apples (cypermethrin).

The Meeting received plant metabolism studies with cypermethrin in lettuce. Most of the residue remained on the outer leaves and parent cypermethrin was the major component of the residue.

Lettuce

In a lettuce metabolism study in the UK, Wright (1977, SBL 11/77/I/AC 406) foliar sprayed lettuce plants (Cultivar: All-the-year-round) in boxes exposed to natural rainfall and sunlight twice with [^{14}C]cyclopropyl and [^{14}C]benzyl-labelled cypermethrin formulated as an EC at the equivalent of 0.3 kg ai/ha. Lettuce plants were sampled 18 and 21 days after the second application. The residue was mostly on the outer leaves and parent cypermethrin constituted 30% and 50% of the residue (Table 1).

Table 1 Distribution of residues in lettuce after foliar application of [^{14}C]cypermethrin (Wright, 1977, SBL 11/77/I/AC 406).

Component	TRR expressed as cypermethrin, mg/kg	
	Benzyl label	Cyclopropyl label
TRR, whole lettuce	1.01	0.83
TRR, inner leaves	0.32	0.13
TRR, outer leaves	1.49	1.46

Component	TRR expressed as cypermethrin, mg/kg	
	Benzyl label	Cyclopropyl label
Parent cypermethrin	0.50	0.27
Conjugate of DCVC acid		0.35
Unidentified components	0.46	0.15

Environmental fate in soil

The 2003 JMPR (JMPR, 2003) explained the data requirements for studies of environmental fate. The focus should be on those aspects that are most relevant to MRL setting. For cypermethrin, supervised residue trials data are available for root and tuber vegetables, which means that aerobic degradation in soil is relevant, as well as the normal requirements for hydrolysis and rotational crop studies. The 2003 report does not mention soil photolysis studies; however, such studies should be relevant for the same reasons as for aerobic soil degradation—nature and magnitude of residues in soil.

The Meeting received information on soil aerobic metabolism and soil photolysis properties of cypermethrin.

The estimated half-life of parent cypermethrin during aerobic soil metabolism at 20 °C ranged from 6 to 25 days. Mineralization ranged from 39% to 78% during 90–120 days. Identified metabolites were 3-phenoxybenxoic acid and DCVA. Cyperamide, 3-phenoxybenxoic acid and DCVA were identified products of cypermethrin soil surface photolysis.

Soil metabolism

Brice and Cooke (2006, 1669/012-D2149) studied the metabolism of cypermethrin in four soils (two sandy loams, a clay loam and a silty clay loam) under aerobic conditions. At 20 °C, the half-lives for disappearance of cypermethrin were in the range of 6 to 24 days. The trans isomers disappeared more quickly than the cis. The cis-trans ratio of the test material was 40:60. After 90 or 120 days of exposure, the cis:trans ratio of the remaining cypermethrin was in the range 60:40 to 73:27. The identified metabolites were 3-phenoxybenzoic acid and *cis*- and *trans*-DCVA, both of which reached their peak concentrations in a short time, demonstrating that they were not persistent. Details are summarised below.

Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-benzyl-ring]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 22% max water-holding capacity
Soil: sandy loam	pH: 7.3	Organic matter: 4.0%
Half-life (parent): 13 days		^{14}C accountability 88–99%
% cypermethrin remaining, day 90 = 9.0% of dose		% mineralization, day 90 = 39% of dose
cis:trans ratio at day 90: 68:32		% unextractable, day 90 = 37% of dose
Metabolites	Max (% of dose)	Day
3-phenoxybenzoic acid	7.4%	3
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-cyclopropyl]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 22% max water-holding capacity
Soil: sandy loam	pH: 7.3	Organic matter: 4.0%
Half-life (parent): 15 days		^{14}C accountability 98–100.4%
% cypermethrin remaining, day 90 = 11.1% of dose		% mineralization, day 90 = 70% of dose
cis:trans ratio at day 90: 70:30		% unextractable, day 90 = 14% of dose
Metabolites	Max (% of dose)	Day

DCVA	14.2%	7
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-benzyl-ring]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 120 days	Temp: 10 °C	Moisture: 22% max water-holding capacity
Soil: sandy loam	pH: 7.3	Organic matter: 4.0%
Half-life (parent): 52 days		^{14}C accountability—
% cypermethrin remaining, day 90 = 18% of dose		% mineralization, day 120 = 35% of dose
cis:trans ratio at day 90: 64:36		% unextractable, day 120 = 27% of dose
Metabolites	Max (% of dose)	Day
3-phenoxybenzoic acid	7.3%	14
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-cyclopropyl]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 120 days	Temp: 10 °C	Moisture: 22% max water-holding capacity
Soil: sandy loam	pH: 7.3	Organic matter: 4.0%
Half-life (parent): 52 days		^{14}C accountability—
% cypermethrin remaining, day 120 = 21% of dose		% mineralization, day 120 = 49% of dose
cis:trans ratio at day 120: 65:35		% unextractable, day 120 = 14% of dose
Metabolites	Max (% of dose)	Day
DCVA	14.6 %	30
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-benzyl-ring]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 120 days	Temp: 20 °C	Moisture: 13% max water-holding capacity
Soil: sandy loam	pH: 5.3	Organic matter: 1.9%
Half-life (parent, days 0–58): approximately 20 days		^{14}C accountability—
% cypermethrin remaining, day 120 = 29% of dose		% mineralization, day 120 = 37% of dose
cis:trans ratio at day 120: 64:36		% unextractable, day 120 = 20% of dose
Metabolites	Max (% of dose)	Day
3-phenoxybenzoic acid	2.4%	7
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-cyclopropyl]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 120 days	Temp: 20 °C	Moisture: 13% max water-holding capacity
Soil: sandy loam	pH: 5.3	Organic matter: 1.9%
Half-life (parent, days 0–58): approximately 25 days		^{14}C accountability—
% cypermethrin remaining, day 120 = 12% of dose		% mineralization, day 120 = 56% of dose
cis:trans ratio at day 120: 69:31		% unextractable, day 120 = 16% of dose
Metabolites	Max (% of dose)	Day
DCVA	4.4 %	7
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-benzyl-ring]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 33% max water-holding capacity
Soil: clay loam	pH: 7.5	Organic matter: 7.2%
Half-life (parent): approximately six days		^{14}C accountability—
% cypermethrin remaining, day 90 = 4.9% of dose		% mineralization, day 90 = 54% of dose
cis:trans ratio at day 90: 64:36		% unextractable, day 90 = 36% of dose
Metabolites	Max (% of dose)	Day
3-phenoxybenzoic acid	10.2%	7
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149

Test material: [^{14}C-cyclopropyl]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 33% max water-holding capacity
Soil: clay loam	pH: 7.5	Organic matter: 7.2%
Half-life (parent): approximately six days		^{14}C accountability—
% cypermethrin remaining, day 90 = 5.7% of dose		% mineralization, day 90 = 78% of dose
cis:trans ratio at day 90: 60:40		% unextractable, day 90 = 16% of dose
Metabolites	Max (% of dose)	Day
DCVA	17.5%	7
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-benzyl-ring]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 35% max water-holding capacity
Soil: silty clay loam	pH: 6.8	Organic matter: 7.9%
Half-life (parent): approximatelyimatelyimately eight days		^{14}C accountability—
% cypermethrin remaining, day 90 = 6.0% of dose		% mineralization, day 90 = 54% of dose
cis:trans ratio at day 90: 73:27		% unextractable, day 90 = 33% of dose
Metabolites	Max (% of dose)	Day
3-phenoxybenzoic acid	5.5%	3
Aerobic soil metabolism		Ref: Brice and Cooke, 2006, 1669/012-D2149
Test material: [^{14}C-cyclopropyl]cypermethrin cis:trans 40:60		Dose rate: 0.3 mg ai/kg
Duration: 90 days	Temp: 20 °C	Moisture: 35% max water-holding capacity
Soil: silty clay loam	pH: 6.8	Organic matter: 7.9%
Half-life (parent): approximately eight days		^{14}C accountability—
% cypermethrin remaining, day 90 = 7.3% of dose		% mineralization, day 90 = 75% of dose
cis:trans ratio at day 90: 67:33		% unextractable, day 90 = 15% of dose
Metabolites	Max (% of dose)	Day
DCVA	9.3%	7

Soil surface photolysis		Ref: Swales, 2003, 40/44-D2149
Test material: [^{14}C]cyclopropyl-cypermethrin cis:trans 40:60		Dose rate: equiv to 25g ai/ha
Duration: 15 days continuous (360 h)	Temp: 20 ± 3 °C	Moisture: 35% max water-holding capacity
Soil type: not stated	pH: 5.7	Organic matter: 7.8%
Light source: xenon lamp with filters to simulate natural sunlight		^{14}C accountability 95–106%
Half-life (cis): 693 hours (DC > 100 days) Half-life (trans): 696 hours (DC 420 hours)		Mineralization, day 15: 5.1% of dose (DC 0.2%)
% cypermethrin remaining, day 15 = 64% of dose (DC 66%) Cypermethrin, day 15: cis:trans 41:59 (DC 55:45)		Unextractable, day 15: 1% of dose (DC 9.3%)
Transformation products	Max (% of dose)	Day
Cyperamide	19% (DC 4.6%)	9 (DC 9)
DCVA	3.1% (DC 24%)	12 (DC 15)
Soil surface photolysis		Ref: Swales, 2003, 40/44-D2149
Test material: [^{14}C]phenoxy ring cypermethrin cis:trans 40:60		Dose rate: equiv to 25g ai/ha
Duration: 15 days continuous (360 h)	Temp: 20 ± 3 °C	Moisture: 35% max water-holding capacity
Soil type: not stated	pH: 5.7	Organic matter: 7.8%
Light source: xenon lamp with filters to simulate natural sunlight		^{14}C accountability 96–104%
Half-life (cis): 534 hours (DC > 100 days) Half-life (trans): 469 hours (DC 481 hours)		Mineralization, day 15: 6.0% of dose (DC 2.5%)
% cypermethrin remaining, day 15 = 59% of dose (DC 74%)		Unextractable, day 15: 22% of dose (DC 11%)

Cypermethrin, day 15: cis:trans 41:59 (DC 55:45)

Transformation products	Max (% of dose)	Day
Cyperamide	15% (DC 3.8%)	7 (DC 4-7)
3-phenoxybenzoic acid	5.7% (DC 13%)	4 (DC 15)

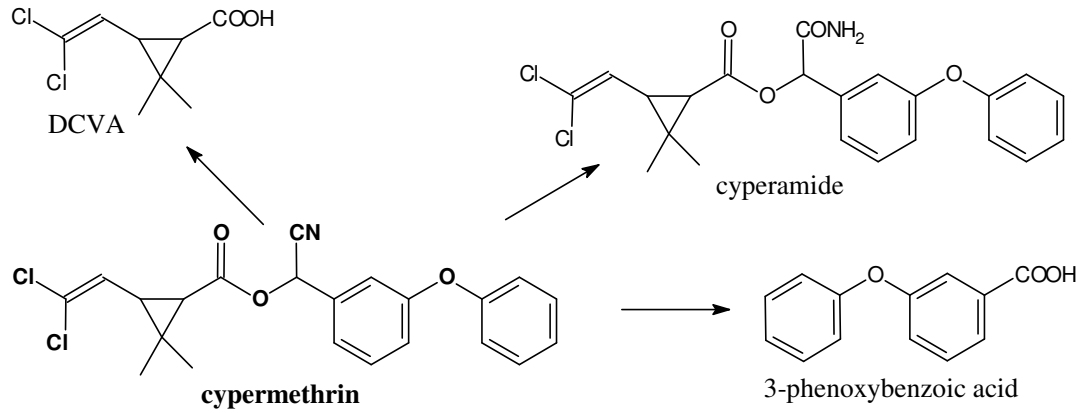


Figure 1 Proposed metabolic pathway for cypermethrin in soils, including soil surface photolysis

METHODS OF RESIDUE ANALYSIS

Analytical methods

The Meeting received descriptions and validation data for analytical methods for residues of cypermethrin in plant and animal commodities.

Residue analytical methods for cypermethrin rely on GC-ECD and GC-MS. Typical LOQs achieved for plant and animal commodities fall in the range of 0.01–0.05 mg/kg. Methods have been subjected to independent laboratory validation.

Hamberger (2008, 20061189/01-RVR) explained that the analytical methods that were used in generating the supervised trials data for cypermethrin were based on a published multi-residue method (Fillion *et al*., 2000). The methods are described below. The LOQs were typically 0.01 mg/kg.

Various crops (Anon, CYP/R17/)

Analyte:	cypermethrin	GC-ECD	Method :CYP/R17/
LOQ:	Limit of detection < 0.1 mg/kg.		
Description	Homogenized sample is extracted with water + methanol + acetonitrile. After the mixture is centrifuged, the supernatant solution is filtered through glass wool. The solution is treated with sodium chloride and then extracted with chloroform. The extract is dried with sodium sulphate and then evaporated before the residue is taken up in toluene for cleanup through a Florisil column. The eluate is evaporated and the residue taken up in toluene for GCD-ECD analysis. The method has been used for analysis of vegetables, fruit and oilseed rape. Procedural recoveries: 69–124%.		

Oilseed rape oil (Devine, 2003, CEMR-1933)

Analyte:	cypermethrin	GC-ECD	Method :CLE 0040/037-03RO
LOQ:	0.05 mg/kg for oilseed rape oil.		

Description An analytical portion of oil is mixed with hexane and extracted with acetonitrile. The acetonitrile extract is then diluted with 2% aqueous sodium chloride and extracted with hexane. The hexane extract is dried with sodium sulphate and evaporated prior to Florisil column cleanup. The cleaned up extract is analysed by GC-ECD on two separate columns.

Oilseed rape and wheat grain (Devine, 2003, CEMR-1932)

Analyte:	cypermethrin	GC-ECD	Method : CLE 0040/037-03R

LOQ: 0.05 mg/kg for oilseed rape oil. 0.025 mg/kg for wheat grain

Description Homogenized sample is extracted with hexane + acetone and the extract is filtered. The extract is cleaned up by solvent partitioning and Florisil column chromatography. The chosen fraction of eluate is evaporated and the residue is taken up in toluene for GC-ECD analysis on two separate columns.

Oilseed rape oil (Wimbush, 2002, 40/037-D2149)

Analyte:	cypermethrin	GC-ECD	Method :CLE 0040/037-03RO

LOQ: 0.05 mg/kg for oilseed rape oil.

Description An analytical portion of oil is dissolved in hexane and the hexane solution is extracted with acetonitrile. The acetonitrile phase is then washed with hexane and then diluted with aqueous sodium chloride. The residues are then extracted into hexane. The hexane is evaporated and the residue is taken up in hexane for Florisil column cleanup. Cypermethrin is eluted from the column with hexane/toluene. After evaporation, the residue is taken up in toluene for GC-ECD analysis. The stereoisomers are measured individually and the total cypermethrin residue is calculated by summing the four individual concentrations.

Bovine liver, kidney, muscle, fat. hen eggs (Devine, 2003, CEMR-1934)

Analyte:	cypermethrin	GC-MS	Method :CLE 0040/041-01R

LOQ: 0.05 mg/kg for bovine muscle and bovine fat. 0.01 mg/kg for hen eggs

Description An analytical portion of the tissue is extracted with acetonitrile by maceration or sonication. After centrifugation, the supernatant acetonitrile solution is extracted with hexane before evaporation. The residue is taken up in hexane and cleaned up on a silica SPE cartridge, with elution by ethyl acetate in hexane. After evaporation, the residue is taken up in toluene for GC-MS analysis.

The method monitors three ions (m/z 207, 209, 211–originating from the dichlorovinyl-dimethylcyclopanecarboxyl moiety) for identification of cypermethrin residues. Each stereoisomer is measured individually and the total cypermethrin residue is calculated by summing the four individual concentrations.

Bovine milk (Devine, 2003, CEMR-1935)

Analyte:	cypermethrin	GC-MS	Method CLE 0040/041-02R.M

LOQ: 0.005 mg/kg for bovine milk

Description Potassium oxalate solution, ethanol, diethyl ether and hexane are added to an analytical portion of milk, after which the mixture is shaken and centrifuged. The top layer (ether and hexane) is separated and evaporated. The residue is taken up in hexane and partitioned into acetonitrile. After evaporation of the separated acetonitrile layer, the residue is taken up in toluene for GC-MS analysis.

The method monitors three ions (m/z 207, 209, 211–originating from the dichlorovinyl-dimethylcyclopanecarboxyl moiety) for identification of cypermethrin residues. Each stereoisomer is measured individually and the total cypermethrin residue is calculated by summing the four individual concentrations.

Plant material (Class, 2007, P 1188 G)

Analyte:	cypermethrin	GC-MS	Method : 20051123/E1-FPHL and 20051123/E1-FPMA

LOQ: 0.01 mg/kg for plant material

Description An analytical portion of the plant commodity is homogenized with acetonitrile. After addition of sodium chloride, supernatant liquid is removed, treated with anhydrous sodium sulphate and well shaken. An aliquot of the resulting dried solution is evaporated to dryness. The residue is taken up in an acetonitrile-toluene mixture and cleaned up by passage through SPE cartridges. The relevant eluate is evaporated and the residue is taken up in toluene for GC-MS analysis.

The method monitors m/z 181 for quantification and m/z 163–165 for identification of cypermethrin residues. Each stereoisomer is measured individually and the total cypermethrin residue is calculated by summing the four individual concentrations.

Devine (2003, CEMR-1934) subjected method CLE 0040/041-01R, as applied to bovine muscle, bovine fat and hen eggs, to independent laboratory validation. The method for cypermethrin was confirmed with an LOQ of 0.05 mg/kg for bovine muscle and bovine fat and an LOQ of 0.01 mg/kg for hen eggs.

Devine (2003, CEMR-1935) subjected method CLE 0040/041-02R.M, as applied to bovine milk, to independent laboratory validation. The method for cypermethrin was confirmed with an LOQ of 0.005 mg/kg for bovine milk.

Class (2007, P 1188 G) subjected method 20051123/E1-FPHL and 20051123/E1-FPMA, as applied to lettuce and maize kernels, to independent laboratory validation. The method for cypermethrin was confirmed with an LOQ of 0.01 mg/kg.

Wimbush (2002, 40/037-D2149) validated analytical method CLE 0040/037-03R for rape-seed and wheat grain and straw and analytical method CLE 0040/037-03RO for oilseed rape oil. The methods are adapted from multi-residue method DFG S23 for pyrethroids. The LOQ for rape seed and oil was 0.05 mg/kg and for wheat grain and straw was 0.025 mg/kg.

Wimbush (2003, 40/041-D2149) validated analytical method CLE 0040/041-01R for bovine tissues and hen eggs and analytical method CLE 0040/041-02R.M for milk. The LOQ for bovine tissues was 0.05 mg/kg, for eggs 0.01 mg/kg and for milk 0.005 mg/kg. Good agreement between quantitative results from ions 207 and 209 assisted with identification (or confirmation) of the cypermethrin residue. The third ion (m/z 211) was not of sufficient intensity to use as a quantitative confirmation at low residue concentrations.

Recovery data from the internal and independent laboratory validation (ILV) testing for cypermethrin residues in plant and animal commodities are summarised in Table 2.

Table 2 Analytical recoveries for spiked cypermethrin in various substrates

Commodity	Spiked analyte	Spike conc, mg/kg	n	Mean recov%	Range recov%	Method	Ref
bovine fat	cypermethrin	0.05	5	96%	92–101%	CLE 0040/041-01R	CEMR-1934
bovine fat	cypermethrin	0.05	5	82% 83%	78–84%[a] 80–88%[b]	CLE 0040/041-01R	40/041-D2149
bovine fat	cypermethrin	0.5	5	79%	72–86%	CLE 0040/041-01R	CEMR-1934
bovine fat	cypermethrin	0.5	5	97% 95%	93–101%[a] 91–99%[b]	CLE 0040/041-01R	40/041-D2149
bovine kidney	cypermethrin	0.05	5	100% 103%	95–103%[a] 97–106%[b]	CLE 0040/041-01R	40/041-D2149
bovine kidney	cypermethrin	0.5	5	87% 87%	84–89%[a] 85–89%[b]	CLE 0040/041-01R	40/041-D2149
bovine liver	cypermethrin	0.05	5	85% 92%	83–87%[a] 83–104%[b]	CLE 0040/041-01R	40/041-D2149
bovine liver	cypermethrin	0.5	5	86% 89%	81–90%[a] 87–91%[b]	CLE 0040/041-01R	40/041-D2149
bovine milk	cypermethrin	0.005	5	82%	73–88%	CLE 0040/041-02R.M	CEMR-1935
bovine milk	cypermethrin	0.005	5	92% 90%	84–106%[a] 82–105%[b]	CLE 0040/041-01R	40/041-D2149
bovine milk	cypermethrin	0.05	5	96%	91–100%	CLE 0040/041-02R.M	CEMR-1935
bovine milk	cypermethrin	0.05	5	77% 76%	62–90%[a] 62–88%[b]	CLE 0040/041-01R	40/041-D2149
bovine muscle	cypermethrin	0.05	5	83%	82–85%	CLE 0040/041-01R	CEMR-1934
bovine muscle	cypermethrin	0.05	5	87% 89%	86–91%[a] 87–92%[b]	CLE 0040/041-01R	40/041-D2149
bovine muscle	cypermethrin	0.5	5	85%	78–89%	CLE 0040/041-01R	CEMR-1934
bovine muscle	cypermethrin	0.5	5	81% 81%	80–84%[a] 79–84%[b]	CLE 0040/041-01R	40/041-D2149
hen eggs	cypermethrin	0.01	5	101%	98–102%	CLE 0040/041-01R	CEMR-1934
hen eggs	cypermethrin	0.01	5	83% 82%	80–87%[a] 80–84%[b]	CLE 0040/041-01R	40/041-D2149
hen eggs	cypermethrin	0.1	5	85%	84–86%	CLE 0040/041-01R	CEMR-1934
hen eggs	cypermethrin	0.1	5	91% 91%	87–94%[a] 85–94%[b]	CLE 0040/041-01R	40/041-D2149
Lettuce	cypermethrin	0.01	5	102% 95%	96–116% 92–99%[c]	20051123/E1-FPHL	P 1188 G
Lettuce	cypermethrin	0.1	5	101% 88%	88–119% 83–94%[c]	20051123/E1-FPHL	P 1188 G
maize kernel	cypermethrin	0.01	5	103% 107%	102–106% 90–131%[c]	20051123/E1-FPMA	P 1188 G
maize kernel	cypermethrin	0.1	5	110% 106%	104–120% 102–112%[c]	20051123/E1-FPMA	P 1188 G
oilseed rape oil	cis I cypermethrin	0.05	5	105%	93–116%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cis I cypermethrin	0.5	5	81%	74–88%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cis II cypermethrin	0.05	5	72%	55–89%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cis II cypermethrin	0.5	5	75%	67–86%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cypermethrin	0.05	5	100%	87–113%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cypermethrin	0.05	5	89%	87–94%	CLE 0040/037-03RO	40/037-D2149
oilseed rape oil	cypermethrin	0.05	5	75%	73–80%	CLE 0040/037-03RO	40/037-D2149

Commodity	Spiked analyte	Spike conc, mg/kg	n	Mean recov%	Range recov%	Method	Ref
oilseed rape oil	cypermethrin	0.5	5	78%	69–88%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	cypermethrin	0.5	5	79%	76–82%	CLE 0040/037-03RO	40/037-D2149
oilseed rape oil	cypermethrin	0.5	5	78%	76–82%	CLE 0040/037-03RO	40/037-D2149
oilseed rape oil	trans I cypermethrin	0.05	5	107%	96–120%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	trans I cypermethrin	0.5	5	79%	69–89%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	trans II cypermethrin	0.05	5	110%	95–124%	CLE 0040/037-03RO	CEMR-1933
oilseed rape oil	trans II cypermethrin	0.5	5	77%	66–88%	CLE 0040/037-03RO	CEMR-1933
oilseed rape seed	cis I cypermethrin	0.05	5	84%	82–89%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cis I cypermethrin	0.5	5	89%	79–91%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cis II cypermethrin	0.05	5	83%	75–87%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cis II cypermethrin	0.5	5	84%	77–87%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cypermethrin	0.05	5	79 %	75–85%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cypermethrin	0.05	5	89%	87–94%	CLE 0040/037-03R	40/037-D2149
oilseed rape seed	cypermethrin	0.05	5	98%	93–106%	CLE 0040/037-03R	40/037-D2149
oilseed rape seed	cypermethrin	0.5	5	85%	78–88%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	cypermethrin	0.5	5	85%	80–91%	CLE 0040/037-03R	40/037-D2149
oilseed rape seed	cypermethrin	0.5	5	92%	88–97%	CLE 0040/037-03R	40/037-D2149
oilseed rape seed	trans I cypermethrin	0.05	5	78%	72–84%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	trans I cypermethrin	0.5	5	86%	79–89%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	trans II cypermethrin	0.05	5	75%	71–80%	CLE 0040/037-03R	CEMR-1932
oilseed rape seed	trans II cypermethrin	0.5	5	83%	75–87%	CLE 0040/037-03R	CEMR-1932
wheat grain	cis I cypermethrin	0.025	5	84%	76–88%	CLE 0040/037-03R	CEMR-1932
wheat grain	cis I cypermethrin	0.25	5	76%	70–81%	CLE 0040/037-03R	CEMR-1932
wheat grain	cis II cypermethrin	0.025	5	75%	67–79%	CLE 0040/037-03R	CEMR-1932
wheat grain	cis II cypermethrin	0.25	5	69%	59–79%	CLE 0040/037-03R	CEMR-1932
wheat grain	cypermethrin	0.025	5	77%	69–80%	CLE 0040/037-03R	CEMR-1932
wheat grain	cypermethrin	0.025	5	84%	71–93%	CLE 0040/037-03R	40/037-D2149
wheat grain	cypermethrin	0.025	5	105%	101–106%	CLE 0040/037-03R	40/037-D2149
wheat grain	cypermethrin	0.25	5	72%	64–80%	CLE 0040/037-03R	CEMR-1932
wheat grain	cypermethrin	0.25	5	87%	79–92%	CLE 0040/037-03R	40/037-D2149
wheat grain	cypermethrin	0.25	5	98%	87–102%	CLE 0040/037-03R	40/037-D2149
wheat grain	trans I cypermethrin	0.025	5	75%	68–77%	CLE 0040/037-03R	CEMR-1932
wheat grain	trans I cypermethrin	0.25	5	74%	65–82%	CLE 0040/037-03R	CEMR-1932
wheat grain	trans II cypermethrin	0.025	5	73%	66–78%	CLE 0040/037-03R	CEMR-1932
wheat grain	trans II cypermethrin	0.25	5	68%	58–77%	CLE 0040/037-03R	CEMR-1932
wheat straw	cypermethrin	0.025	5	110%	104–117%	CLE 0040/037-03R	40/037-D2149
wheat straw	cypermethrin	0.025	5	94%	90–98%	CLE 0040/037-03R	40/037-D2149
wheat straw	cypermethrin	0.25	5	90%	84–95%	CLE 0040/037-03R	40/037-D2149
wheat straw	cypermethrin	0.25	5	97%	93–105%	CLE 0040/037-03R	40/037-D2149

[a] GC-MS, quantification on m/z 207 ion.

[b] GC-MS, quantification on m/z 209 ion.

[c] Confirmatory measurements with GC-MS-MS.

Stability of residues in stored analytical samples

Information was received on the freezer storage stability of cypermethrin residues in plant commodities.

Table 3 Freezer storage stability data for cypermethrin spiked into matrices of lettuce, green peas, rape seed and wheat grain. Recorded residue levels are unadjusted for recoveries.

Storage interval	Procedural recov %	Cypermethrin, mg/kg	Storage interval	Procedural recov %	Cypermethrin, mg/kg
LETTUCE, homogenized matrix, fortified with cypermethrin at 0.2 mg/kg (Hamberger, 2007, 20051287/01-RSS), storage temperature approximately –22 °C			GREEN PEAS, homogenized matrix, fortified with cypermethrin at 0.2 mg/kg (Hamberger, 2007, 20051287/01-RSS), storage temperature approximately –22 °C		
0		0.18, 0.19	0		0.20, 0.20
6 months	85%	0.18, 0.19	6 months	86%	0.18, 0.19
12 months	92%	0.18, 0.19	12 months	88%	0.195, 0.195
residues apparently stable			residues apparently stable		
RAPE SEED, fortified with cypermethrin at 0.5 mg/kg (Wimbush and Iriam, 2003, 40/042-D2149), storage temperature approximately –20 ˚C.			WHEAT GRAIN, fortified with cypermethrin at 0.25 mg/kg (Wimbush and Iriam, 2003, 40/042-D2149), storage temperature approximately –20 ˚C.		
0		0.50, 0.47, 0.44, 0.47, 0.46	0		0.24, 0.23, 0.24 0.23, 0.23
1 month	95%	0.43, 0.43, 0.40	1 month	95% 92%	0.23, 0.25, 0.21
3 months	109% 104%	0.49, 0.52, 0.51	3 months	95% 106%	0.20, 0.21, 0.21
6 months	93% 96%	0.49, 0.45, 0.40	6 months	97% 110%	0.20, 0.19, 0.20
9 months	99% 117%	0.51, 0.42, 0.52	9 months	90% 104%	0.23, 0.20, 0.22
12 months	83% 100%	0.45, 0.46, 0.44	12 months	78% 82%	0.21, 0.21, 0.22
residues apparently stable			residues apparently stable		

USE PATTERN

Cypermethrin, a pyrethroid compound, is a non-systemic insecticide acting by ingestion and contact. Cypermethrin also exhibits anti-feeding behaviour (repellent).

Copies of cypermethrin labels from the following countries were made available to the Meeting: Algeria, Austria, Belgium, Bulgaria, Cameroon, Cuba, Cyprus, Czech Republic, Dominican Republic, France, Ghana, Greece, Hungary, Ireland, Italy, Kuwait, Macedonia, Madagascar, Mauritius, Morocco, Poland, Portugal, Qatar, Romania, Senegal, Slovakia, Somalia, Spain, Sweden, Switzerland, Taiwan, Tunisia, Turkey, the Ukraine and the UK. The labels are evidence of an extensive range of uses of cypermethrin. Only some of the labels (those in English) were readable by the reviewer and the compilation of registered uses is based on the summary prepared by the proposer.

Table 4 Registered uses of cypermethrin in horticultural and field crops.

Crop	Country	Application						PHI days
		Form	Type	Max rate kg ai/ha	Max conc kg ai/hL	Spray vol, L/ha	Max number	
Alfalfa	Spain	EC	foliar		0.01			14
Artichokes	Spain	EC	foliar		0.01			7
Asparagus	Thailand	EC	foliar		0.025	750		3
Barley	Japan	EC WG	high vol		0.003		3	21
Barley	UK	EC	foliar	0.025			3	before 31 March

Crop	Country	Application						PHI days
		Form	Type	Max rate kg ai/ha	Max conc kg ai/hL	Spray vol, L/ha	Max number	
Bean, common	Japan	WP	high vol		0.006		5	1
Bean, field	UK	EC	foliar	0.025			3	-
Beans	Italy	EC	foliar		0.0075			14
Beans	Italy	EC	foliar, indoor		0.0075			7
Beans	Poland	EC, includes chlorpyrifos	foliar	0.025		200–600		14
Beans	Spain	EC	foliar		0.01			3
Broccoli	Italy	EC	foliar		0.0075			14
Broccoli	Italy	EC	foliar, indoor		0.0075			7
Broccoli	Spain	EC	foliar		0.01			7
Broccoli	UK	EC	foliar	0.025			-	-
Brussels sprouts								
Brussels sprouts	UK	EC	foliar	0.025			-	-
Cabbage	UK	EC	foliar	0.025			-	-
Cabbage, head	Italy	EC	foliar		0.0075			14
Cabbage, head	Italy	EC	foliar, indoor		0.0075			7
Cabbage, head	Japan	WP	high vol		0.006		5	7
Cabbage, head	Poland	EC, includes chlorpyrifos	foliar	0.03		100–600		21
Cabbage, head	Spain	EC	foliar		0.01			7
Cabbage, head	Switzerland	EC	foliar	0.05				14
Carambola	Malaysia	EC	spray	0.0225	0.005	450	4	3
Carrot	Poland	EC, includes chlorpyrifos	foliar	0.025		200–600		14
Carrots	Spain	EC	foliar		0.01			7
Carrots	Switzerland	EC	foliar	0.05				14
Cauliflower	Italy	EC	foliar, indoor		0.0075			7
Cauliflower	Italy	EC	foliar		0.0075			14
Cauliflower	Spain	EC	foliar		0.01			7
Cauliflower	UK	EC	foliar	0.025			-	-
Cereals, winter and spring	Austria	EC	foliar	0.025		300		21
Cereals, winter and spring	France	EC	foliar	0.025				
Cereals, winter and spring	Hungary	EC	foliar	0.0375		300–400		10
Cereals, winter and spring	Italy	EC	foliar		0.005			42
Cereals, winter and spring	Poland	EC, includes chlorpyrifos	foliar	0.03		150–400		30

Crop	Country	Application						PHI days
		Form	Type	Max rate kg ai/ha	Max conc kg ai/hL	Spray vol, L/ha	Max number	
Cereals, winter and spring	Switzerland	EC	foliar	0.05				42
Cherry, sweet	Japan	WP	high vol		0.006		2	3
Citrus fruits	Japan	WP EC	high vol		0.006		5	7
Cotton	Italy	EC	foliar		0.005			21
Cucumber	Japan	WP EC	high vol		0.006		5	1
Durian	Thailand	EC	foliar		0.0125	20 L/tree		14
Egg plant	Japan	WP EC	high vol		0.006		5	1
Grapes	France	EC	foliar	0.030	0.05			
Grapes	France	EC	foliar	0.025			3	21
Grapes	Italy	EC	foliar		0.0075			28
Hops	Poland	EC, includes chlorpyrifos	foliar		0.05			30
Hops	Spain	EC	foliar		0.01			14
Kale	UK	EC	foliar	0.025			-	-
Leek	Poland	EC, includes chlorpyrifos	foliar	0.03		200–600		21
Leek	Switzerland	EC	foliar	0.05				14
Lettuce								
Lettuce, head	Japan	WP EC	high vol		0.003		5	7
Litchi	Thailand	EC	foliar		0.0075	15 L/tree	3	14
Longan	Thailand	EC	foliar		0.0075	15 L/tree		14
Maize	Austria	EC	foliar		0.0075	400		49
Maize	Italy	EC	foliar		0.0075			
Maize	Italy	EC	foliar		0.005			30
Maize	Japan	EC	high vol		0.006		3	7
Maize	Japan	WG	high vol		0.003		3	7
Mango	Malaysia	EC	spray	0.081	0.013	650	10	14
Mango	Thailand	EC	foliar		0.005	10 L/tree		5
Melons	Austria	EC	foliar		0.002	300		21
Melons	Spain	EC	foliar		0.010			3
Oilseed rape	Austria	EC	foliar	0.025		300		56
Oilseed rape	Hungary	EC	foliar	0.0375		300–400	.	10
Oilseed rape	Italy	EC	foliar		0.0075			3
Oilseed rape	Italy	EC, includes chlorpyrifos	foliar	0.06		1000		120
Oilseed rape	Poland	EC, includes chlorpyrifos	foliar	0.03		150–400		21
Oilseed rape	Switzerland	EC	foliar	0.05				42
Oilseed rape	UK	EC	foliar	0.025			4	final—end of flowering
Okra	Thailand	EC	foliar		0.011	750		5
Olives								

Crop	Country	Application						PHI days
		Form	Type	Max rate kg ai/ha	Max conc kg ai/hL	Spray vol, L/ha	Max number	
Onion, bulb	Japan	EC	✈	0.03	0.13	24	5	7
Onion, bulb	Japan	WG	high vol		0.003		5	7
Onion, bulb	Japan	WP	high vol		0.006		5	7
Onions	Italy	EC	foliar		0.0075			14
Onions	Poland	EC, includes chlorpyrifos	foliar	0.025		200–600		21
Onions	Switzerland	EC	foliar	0.05				14
Papaya	Malaysia	EC	spray	0.0275	0.0055	500		14
Pea fodder	Poland	EC, includes chlorpyrifos	foliar	0.025		200–600		14
Pea, vining	UK	EC	foliar	0.025			3	
Peach	Japan	WP	high vol		0.006		5	7
Peas	Italy	EC	foliar		0.0075			14
Peas	Italy	EC	foliar, indoor		0.0075			7
Peas	Italy	EC, includes chlorpyrifos	foliar, indoor		0.004			15
Peas	Spain	EC	foliar		0.01			7
Peppers, chilli	Thailand	EC	foliar		0.025	500		7
Peppers, sweet	Japan	WP EC	high vol		0.003		5	1
Potatoes	Japan	WG	high vol		0.0045		4	7
Potatoes	Japan	WP	high vol		0.006		4	7
Potatoes	UK	EC	foliar	0.025			-	-
Potatoes	France	EC	foliar	0.030				
Potatoes	Italy	EC	foliar		0.0075			14
Potatoes	Poland	EC, includes chlorpyrifos	foliar	0.02		150–400		30
Potatoes	Spain	EC	foliar		0.01			14
Potatoes	Switzerland	EC	foliar	0.05	0.01			21
Radish, Japanese	Japan	WG	high vol		0.003		5	7
Radish, Japanese	Japan	WP	high vol		0.006		5	7
Solanaceae	Spain	EC	foliar		0.01			3
Soya bean	Japan	EC	high vol		0.003		3	7
Spinach	Japan	EC	high vol		0.006		5	7
Spinach	Spain	EC	foliar		0.01			7
Strawberry	Japan	EC	high vol		0.003		5	1
Sugar beet	Italy	EC	foliar		0.06			21
Sugar beet	Poland	EC, includes chlorpyrifos	foliar	0.035		150–400		30
Sugar beet	Spain	EC	foliar		0.01			21
Sugar beet	Switzerland	EC	foliar	0.05	0.01			42
Sugar beet	UK	EC	foliar	0.025			2	-
Sweet corn	Japan	EC	high vol		0.006		3	7
Sweet corn	Japan	WG	high vol		0.003		3	7

Crop	Country	Application						PHI days
		Form	Type	Max rate kg ai/ha	Max conc kg ai/hL	Spray vol, L/ha	Max number	
Sweet potato	Japan	WP	high vol		0.006		5	7
Tea, green, black	Japan	WP	high vol		0.006		1	14
Tomato	Japan	EC	high vol		0.003		5	1
Tomato	Japan	WP	high vol		0.006		5	1
Tomatoes	Austria	EC	foliar		0.002	300		21
Tomatoes	Hungary	EC	foliar, indoor	0.10	0.02	500–1500	2	3
Tomatoes	Italy	EC	foliar		0.0075			21
Tomatoes	Italy	EC	foliar, indoor		0.0075			21
Tomatoes	Poland	EC, includes chlorpyrifos	foliar	0.025		200–600		21
Wheat	Italy	EC	foliar		0.005			42
Wheat	Japan	EC WG	high vol		0.003		3	21
Wheat	UK	EC	foliar	0.025			3	before 31 March

✈ Aerial application

In Australia, cypermethrin is registered for direct use on livestock, with application methods including plunge dip, spray race, backline spray and pour-on (DPI&F.CYPERMETHRIN.2008.3). Cattle, deer, goats and sheep may be directly treated with cypermethrin with 3 or 8-day withholding periods until slaughter. Restraints include: no use on lactating animals.

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The Meeting received information on supervised field trials for cypermethrin uses that produced residues on the following commodities.

Commodity	Group	Table No.
Grapes	Berries and other small fruits	Table 5
Carambola	Tropical fruit, edible peel	Table 6
Olives	Tropical fruit, edible peel	Table 7
Durian	Tropical fruit, inedible peel	Table 8
Litchi	Tropical fruit, inedible peel	Table 9
Longan	Tropical fruit, inedible peel	Table 10
Mango	Tropical fruit, inedible peel	Table 11
Mango	Tropical fruit, inedible peel	Table 12
Papaya	Tropical fruit, inedible peel	Table 13
Leek	Bulb vegetables	Table 14
Onion	Bulb vegetables	Table 15
Broccoli	Brassica vegetables	Table 16
Brussels sprouts	Brassica vegetables	Table 17
Cabbage, head	Brassica vegetables	Table 18
Cauliflower	Brassica vegetables	Table 19
Melon	Cucurbits	Table 20
Okra	Fruiting vegetables	Table 21
Peppers, chilli	Fruiting vegetables	Table 22
Tomato	Fruiting vegetables	Table 23
Lettuce	Leafy vegetables	Table 24

Commodity	Group	Table No.
Spinach	Leafy vegetables	Table 25
Peas	Legume vegetables	Table 26
Beans	Legume vegetables	Table 27
Carrot	Root and tuber vegetables	Table 28
Potato	Root and tuber vegetables	Table 29
Sugar beet	Root and tuber vegetables	Table 30
Artichoke	Stalk and stem vegetables	Table 31
Asparagus	Stalk and stem vegetables	Table 32
Barley	Cereal grains	Table 33
Maize	Cereal grains	Table 34
Wheat	Cereal grains	Table 35
Wheat	Cereal grains	Table 36
Cotton seed	Oilseed	Table 37
Rapeseed	Oilseed	Table 38
Alfalfa	Legume animal feeds	Table 39
Pea fodder and forage	Legume animal feeds	Table 40
Bean fodder and forage	Legume animal feeds	Table 41
Barley fodder and forage	Straw, fodder and forage of cereal grains	Table 42
Maize fodder and forage	Straw, fodder and forage of cereal grains	Table 43
Wheat fodder and forage	Straw, fodder and forage of cereal grains	Table 44
Sugar beet leaves or tops	Miscellaneous fodder and forage	Table 45

Trials were generally well documented with laboratory and field reports. Laboratory reports included method validation with procedural recoveries from spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analyses or duration of residue sample storage were also provided. Although trials included control plots, no control data are recorded in the tables except where residues in control samples exceeded the LOQ. Control samples are indicated in the summary tables with a "c". Residue data are recorded unadjusted for recovery.

In some of the cypermethrin studies, undetected residues were reported as < LOD (below limit of detection) and they are listed in the residue tables as < LOD. Residues that were detected but below the limit of quantification (LOQ) are listed as < 0.01 (the numerical value of the LOQ). For many commodities, the LOD was 0.003 mg/kg and the LOQ was 0.01 mg/kg.

Residues, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. Those results included in the evaluation are double underlined.

When multiple applications were made to a crop, the application rate, spray concentration and spray volume were not always identical from one application to the next. If the variation was small, only the final values for application rate, concentration and spray volume were recorded. For larger variations all values were recorded.

Conditions of the supervised residue trials were generally well reported in detailed field reports. Most trial designs used non-replicated plots. Most field reports provided data on the sprayers used, plot size, field sample size and sampling date.

Table 5 Cypermethrin residues in grapes resulting from supervised trials with cypermethrin in France, Germany, Greece, Hungary, Italy and Spain

GRAPES	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2007 (Carignan)	EC[b]	0.032	0.005	620	1	0 3 7 14 21	grape bunches	0.04 0.01 < 0.01 < 0.01 < LOD	20074063/E2-FPVI
France, 2007 (Chardonnay)	EC[b]	0.029	0.016	190	1	21	grape bunches	0.01	20074063/E1-FPVI
France, 2007 (Gamay)	EC[b]	0.031	0.015	200	1	0 3 7 14 21	grape bunches	0.03 0.02 < 0.01 < LOD < 0.01	20074063/E1-FPVI
France, 2007 (Maccabeu)	EC[b]	0.032	0.005	630	1	21	grape bunches	< LOD	20074063/E2-FPVI
France, 2007 (Pinot Auxerrois)	EC[b]	0.032	0.016	210	1	21	grape bunches	< LOD	20074063/E1-FPVI
Germany, 2007 (Lemberger)	EC[b]	0.028	0.015	180	1	0 3 7 14 21	grape bunches	0.03 0.01 0.04 0.02 0.01	20074063/E1-FPVI
Germany, 2007 (Riesling)	EC[b]	0.031	0.016	200	1	0 3 7 14 21	grape bunches	0.02 < 0.01 < 0.01 < 0.01 < 0.01	20074063/E1-FPVI
Germany, 2007 (Spätburgunder)	EC[b]	0.030	0.016	190	1	21	grape bunches	0.03	20074063/E1-FPVI
Greece, 2007 (Merlot)	EC[b]	0.031	0.005	590	1	21	grape bunches	< 0.01	20074063/E2-FPVI
Greece, 2007 (Roditis)	EC[b]	0.031	0.005	600	1	0 3 7 14 21	grape bunches	< 0.01 < 0.01 < 0.01 0.01 < 0.01	20074063/E2-FPVI
Hungary, 2007 (Cabernet Sauvignon)	EC[b]	0.031	0.016	200	1	0 3 7 14 21	grape bunches	0.03 0.04 0.01 0.02 < 0.01	20074063/E1-FPVI
Hungary, 2007 (Ezerfürtü)	EC[b]	0.030	0.016	190	1	21	grape bunches	< 0.01	20074063/E1-FPVI
Italy, 2003 (Malvasia) white grapes	EC alpha	0.0087	0.00088	990	2	21	grapes	0.03 alpha-cypermethrin	23139
Italy, 2003 (Malvasia) white grapes	EC	0.028	0.0028	1000	2	21	grapes	0.05	23139
Spain, 2007 (Macabeo)	EC[b]	0.033	0.005	630	1	0 3 7 14 21	grape bunches	0.02 < 0.01 0.02 0.03 < LOD	20074063/E2-FPVI

GRAPES	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Spain, 2007 (Monastrell)	EC[b]	0.032	0.005	610	1	0 3 7 14 21	grape bunches	0.19 0.11 0.08 0.07 0.06	20074063/E2-FPVI
Spain, 2007 (Tempranillo)	EC[b]	0.030	0.005	580	1	21	grape bunches	0.03	20074063/E2-FPVI

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for grapes). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

[b] Formulation contains chlorpyrifos-methyl + cypermethrin. Chlorpyrifos-methyl data are not included in this evaluation.

Table 6 Cypermethrin residues in carambola resulting from supervised trials with cypermethrin in Malaysia

CARAMBOLA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Malaysia, 2004 (B10)	EC	0.023	0.005	450	4	1- 0 3 7	carambola fruit	< 0.02 0.08 <u>0.09</u> 0.09	MRL SF 001
Malaysia, 2004 (B10)	EC	0.023	0.005	450	4	1- 3 5	carambola fruit	< 0.02 < <u>0.02</u> < 0.02	MRL SF 002
Malaysia, 2004 (B10)	EC	0.023	0.005	450	4	1- 0 1 3 5 7	carambola fruit	< 0.02 < 0.02 < 0.02 < <u>0.02</u> < 0.02 < 0.02	MRL SF 003
Malaysia, 2004 (B10)	EC	0.023	0.005	450	3	1- 0 1 3 5 7	carambola fruit	< 0.02 0.02 < 0.02 <u>0.03</u> 0.02 < 0.02	MRL SF 004a
Malaysia, 2004 (B10)	EC	0.023	0.005	450	4	1– 0 4 7	carambola fruit	< 0.02 < 0.02 < <u>0.02</u> < 0.02	MRL SF 004b

Table 7 Cypermethrin residues in olives resulting from supervised trials with cypermethrin in Greece, Italy and Spain

OLIVES	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Greece, 2007 (Halkidikis)	EC	0.061	0.005	1220	2	7	olives	0.04	20074060/E1-FPOL
Greece, 2007 (Megartiki)	EC	0.060	0.005	1200	2	0 1 3 7	olives	0.17 0.21 0.12 0.08	20074060/E1-FPOL

OLIVES	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Italy, 2006 (Coratina)	EC	0.058	0.006	1020 1000	2	0 1 3 7	olives	0.20 0.52 0.21 0.13	20061189/E1-FPOL
Italy, 2006 (Coratina)	EC	0.060	0.006	1060 1030	2	7	olives	0.12	20061189/E1-FPOL
Spain, 2006 (Manzanilla)	EC	0.059	0.006	1040 1020	2	0 1 3 7	olives	0.21 0.41 0.09 0.08	20061189/E1-FPOL
Spain, 2006 (Manzanilla)	EC	0.057	0.006	920 980	2	7	olives	0.08	20061189/E1-FPOL
Spain, 2007 (Manzanilla)	EC	0.058	0.005	1160	2	7	olives	0.33	20074060/E1-FPOL
Spain, 2007 (Picual)	EC	0.058	0.005	1160	2	0 1 3 7	olives	0.17 0.49 0.09 0.09	20074060/E1-FPOL

[a] Residues measured and expressed on olive flesh.

Table 8 Cypermethrin residues in durians resulting from supervised trials with cypermethrin in Thailand

DURIAN	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2003 (Monthong)	EC[b]	1.25	0.0125	10	3	0 1 3 5 10 15	durian fruit	0.33 0.57 0.40 0.57 0.21 0.17	CY-DU-01
Thailand, 2003 (Monthong)	EC[b]	1.25	0.0125	10	3	0 1 3 5 10 15	durian fruit	0.76 0.77 0.38 0.35 0.51 0.38	CY-DU-02
Thailand, 2004 (Monthong)	EC[b]	1.25	0.0125	10	3	0 1 3 5 10 15 22 30	durian fruit	0.63 0.85 0.79 0.85 0.65 0.47 0.34 0.39	CY-DU-03
Thailand, 2004 (Monthong)	EC[b]	1.25	0.0125	10	3	0 3 5 8 10 15 20	durian fruit	0.12 0.09 0.08 0.06 0.06 0.04 0.03	CY-DU-04

DURIAN	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2005 (Monthong)	EC[b]	1.25	0.0125	10	3	0 16 21 32	durian fruit	0.24 <u>0.08</u> 0.07 0.06	CY-DU-05
Thailand, 2005 (Monthong)	EC[b]	1.25	0.0125	10	3	0 16 21 32	durian fruit	0.28 <u>0.10</u> 0.09 0.08	CY-DU-06

[a] Whole fruit excluding seed was analysed and residue calculated on whole fruit.

[b] Formulation: two active ingredients, cypermethrin and phosalone. Residue data for cypermethrin.

Table 9 Cypermethrin residues in litchis resulting from supervised trials with cypermethrin in Thailand

LITCHI	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2006	EC[b]	1.5	0.0075	20	3	0 3 5 7 10 14 20	litchi fruit	1.3 1.2 1.3 1.0 0.48 <u>0.41</u> 0.38	CY-LC-01
Thailand, 2006	EC[b]	1.1	0.0075	15	3	0 1 3 5 7 10 14	litchi fruit	1.1 1.1 1.0 0.69 0.40 0.40 <u>0.25</u>	CY-LC-02
Thailand, 2007	EC[b]	1.5	0.0075	20	3	0 5 8 11 14 18 21	litchi fruit	0.90 1.0 1.0 0.59 0.40 <u>0.45</u> 0.38	CY-LC-03
Thailand, 2007	EC[b]	0.76	0.0075	10	3	0 5 8 11 14 18 21	litchi fruit	1.1 1.6 1.4 0.78 0.62 <u>0.79</u> 0.55	CY-LC-04
Thailand, 2007	EC[b]	1.5	0.0075	20	3	0 11 14 21	litchi fruit	1.1 0.66 <u>0.54</u> 0.30	CY-LC-05
Thailand, 2007	EC[b]	0.75	0.0075	10	3	0 11 14 21	litchi fruit	0.54 0.62 <u>0.57</u> 0.43	CY-LC-06

[a] Whole fruit excluding seed was analysed and residue calculated on whole fruit.

[b] Formulation: two active ingredients, cypermethrin and chlorpyrifos. Residue data for cypermethrin.

Table 10 Cypermethrin residues in longans resulting from supervised trials with cypermethrin in Thailand

LONGAN	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2004 (Edor)	EC[b]	0.375	0.0075	5	4	0 1 3 5 7 14	longan fruit	1.0 1.3 0.89 0.84 0.43 0.28	CY-LG-01
Thailand, 2004 (Edor)	EC[b]	0.375	0.0075	5	4	0 1 3 7 14 21	longan fruit	1.8 1.5 1.3 0.95 0.47 0.34	CY-LG-02
Thailand, 2005 (Edor)	EC[b]	0.375	0.0075	5	4	0 1 3 5 7 10 14	longan fruit	1.5 1.2 0.98 0.79 0.64 0.50 0.32	CY-LG-03
Thailand, 2005 (Edor)	EC[b]	0.375	0.0075	5	4	0 1 3 5 7 10 14	longan fruit	1.4 1.1 0.86 0.57 0.39 0.34 0.27	CY-LG-04
Thailand, 2006 (Edor)	EC[b]	0.375	0.0075	5	3	0 10 14 21	longan fruit	0.93 0.35 0.25 0.12	CY-LG-05
Thailand, 2006 (Edor)	EC[b]	0.375	0.0075	5	3	0 10 14 21 30	longan fruit	1.0 0.51 0.36 0.26 0.25	CY-LG-06

[a] Whole fruit excluding seed was analysed and residue calculated on whole fruit.

[b] Formulation: two active ingredients, cypermethrin and chlorpyrifos. Residue data for cypermethrin.

Table 11 Cypermethrin residues in mangoes resulting from supervised trials with cypermethrin in Thailand

MANGO	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2004 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14	mango fruit	0.10 0.12 0.14 0.09 0.06 0.04 < 0.01	CY-MG-01

MANGO	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/tree	kg ai/hL	water (L/tree)	no.	days		cypermethrin	
Thailand, 2004 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14	mango fruit	0.15 0.20 0.19 0.15 0.12 0.09 < 0.01	CY-MG-02
Thailand, 2004 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14	mango fruit	0.19 0.25 0.18 0.10 0.09 0.04 0.05	CY-MG-03
Thailand, 2006 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14 21	mango fruit	0.67 0.68 0.44 0.35 0.30 0.28 0.26 0.14	CY-MG-04
Thailand, 2006 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14 21	mango fruit	0.15 0.24 0.25 0.23 0.18 0.17 0.09 0.05	CY-MG-05
Thailand, 2006 (Namdokmai)	EC	0.5	0.005	10	4	0 1 3 5 7 10 14 21	mango fruit	0.38 0.43 0.32 0.25 0.21 0.18 0.13 0.05	CY-MG-06

[a] Whole fruit excluding seed was analysed and residue calculated on whole fruit.

Table 12 Cypermethrin residues in mangoes resulting from supervised trials with cypermethrin in Malaysia

MANGO	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Malaysia, 2004 (Chokanan)	EC	0.028	0.006	450	7	1– 0 1 3 5 7	mango fruit	< 0.01 0.10 0.08 0.05 0.03 0.06	MRL Mango 005

MANGO	Application					PHI	Commodity[a]	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Malaysia, 2004 (Chokanan)	EC	0.028	0.006	450	7	1– 0 1 3 5 7	mango fruit	0.09 0.20 0.15 0.15 0.10 0.16	MRL Mango 006a
Malaysia, 2004 (Chokanan)	EC	0.028	0.006	450	8	1– 0 1 3 5 7	mango fruit	0.16 0.21 0.16 0.16 0.19 0.10	MRL Mango 006b

[a] Whole fruit excluding seed was analysed and residue calculated on whole fruit. The original reports expressed the residue on 'whole fruit excluding seed'. A supplementary note (Keong NC, MARDI, 2008) has revised the residue data, which are now expressed on whole fruit.

Table 13 Cypermethrin residues in papaya resulting from supervised trials with cypermethrin in Malaysia

PAPAYA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Malaysia, 2006 (Exotica II)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.07 0.18 0.10 0.09 0.09 0.05 0.06 0.10	CPM/PPY/2006/BT/002
Malaysia, 2006 (Exotica II)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.12 0.17 0.14 0.08 0.06 0.13 0.10 0.12	CPM/PPY/2007/BT/007
Malaysia, 2007 (Exotica II)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.07 0.17 0.16 0.22 0.17 0.16 0.10 0.15	CPM/PPY/2007/Serdang/003
Malaysia, 2007 (Exotica III)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.12 0.23 0.27 0.21 0.23 0.16 0.18 0.23	CPM/PPY/2007/BT/006

PAPAYA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Malaysia, 2007 (Exotica III)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.07 0.10 0.11 0.09 0.09 0.07 0.06 0.08	CPM/PPY/2007/BT/007
Malaysia, 2007 (Exotica III)	EC	0.028	0.0055	500	2	1– 0 1 3 5 7 10 14	papaya whole fruit	0.16 0.41 0.41 0.35 0.17 0.18 0.13 0.15	CPM/PPY/2007/BT/008

Table 14 Cypermethrin residues in leeks resulting from supervised trials with cypermethrin in France, Germany and Poland

LEEKS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2005 (Schelton)	EC	0.026	0.0084	310	2	7	plant	0.12	20051123/E1-FPLK
France, 2005 (Sevilla)	EC	0.025	0.0084	310 300	2	0 3 7	plant	0.47 0.33 0.26	20051123/E1-FPLK
France, 2006 (Shelton)	EC	0.024	0.008	300	2	0 3 7	plant	0.26 0.17 0.16	20061189/E1-FPLK
Germany, 2005 (Kenton)	EC	0.026	0.0084	300 310	2	7	plant	0.20	20051123/E1-FPLK
Germany, 2005 (Porbella)	EC	0.026	0.0082	310	2	0 3 7	plant	0.16 0.10 0.05	20051123/E1-FPLK
Germany, 2005 (Porbella)	ME	0.025 0.023	0.0083	300 270	2	0 3 7	plant	0.18 0.09 0.06	20051123/E1-FPLK
Germany, 2006 (Kenton F1)	EC	0.025	0.008	310	2	0 3 7	plant	0.26 0.23 0.17	20061189/E1-FPLK
Germany, 2006 (Shelton F1)	EC	0.026	0.008	320	2	7	plant	0.09	20061189/E1-FPLK
Germany, 2006 (Shelton F1)	ME	0.026	0.008	310	2	7	plant	0.17	20061189/E1-FPLK
Poland, 2006 (Bulgina)	EC	0.024	0.008	320 300	2	7	plant	< LOD	20061189/E1-FPLK

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for leeks). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 15 Cypermethrin residues in onions resulting from supervised trials with cypermethrin in France, Germany, Greece, Italy, Poland, Spain and the UK

ONIONS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2006 (Hyskin) bulb onion	EC	0.024	0.012	200	2	0 3 7	bulbs	< LOD 0.01 < 0.01	20061189/E1-FPON
France, 2006 (Hyskin) bulb onion	ME	0.024	0.012	220, 190	2	0 3 7	bulbs	0.02 0.01 < 0.01	20061189/E1-FPON
France, 2006 (Toulouge) bulb onion	EC	0.050	0.012	430, 410	2	0 1 3	bulbs	< 0.01 < LOD < LOD	20061189/E1-FPON
France, 2006 (Toulouge) bulb onion	ME	0.051	0.012	420	2	0 1 3	bulbs	< 0.01 < LOD < LOD	20061189/E1-FPON
France, 2006 (Toulouge) bulb onion	EC	0.055	0.012	450, 430	2	3	bulbs	0.02	20061189/E1-FPON
Germany, 2006 (Sturon F1) bulb onion	EC	0.028	0.008	330, 350	2	7	bulbs	< LOD	20061189/E1-FPON
Germany, 2007 (Marco) bulb onion	EC	0.028	0.013	220	2	0 3 7	bulbs	< LOD < LOD < LOD	20074060/E1-FPON
Germany, 2007 (Red Baron) bulb onion	EC	0.028	0.012	230	2	0 3 7	bulbs	< 0.01 < LOD < LOD	20074060/E1-FPON
Greece, 2007 (Apollo)	EC	0.049	0.008	600	2	3	bulbs	< 0.01	20074060/E2-FPON
Greece, 2007 (Dovata di Parma)	EC	0.050	0.008	600	2	0 1 3	bulbs	< LOD < LOD < LOD	20074060/E2-FPON
Italy, 2006 (Density) bulb onion	EC	0.048	0.012	400	2	3	bulbs	< 0.01	20061189/E1-FPON
Poland, 2006 (Blonska) bulb onion	EC	0.026	0.008	320	2	7	bulbs	0.06	20061189/E1-FPON
Spain, 2006 (Retra) bulb onion	EC	0.050	0.012	410	2	0 1 3	bulbs	0.01 0.02 < 0.01	20061189/E1-FPON
Spain, 2007 (Grajuela)	EC	0.051	0.008	610	2	0 1 3	bulbs	< 0.01 < LOD < LOD	20074060/E2-FPON
Spain, 2007 (PX 13011)	EC	0.051	0.008	610	2	3	bulbs	< 0.01	20074060/E2-FPON
UK, 2007 (Rumba) bulb onion	EC	0.026	0.013	210	2	0 3 7	bulbs	< 0.01 < 0.01 < LOD	20074060/E1-FPON
UK, 2007 (Wellington) bulb onion	EC	0.025	0.013	200	2	7	bulbs	< LOD	20074060/E1-FPON
UK, 2007 (Wellington) bulb onion	ME	0.025	0.012	200	2	7	bulbs	< 0.01	20074060/E1-FPON

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for bulb onions). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 16 Cypermethrin residues in broccoli resulting from supervised trials with cypermethrin in France, Germany, Italy, Spain and the UK

BROCCOLI	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Marathon F1-Sakat)	EC	0.026	0.0084	290 300	2	0 3 7	flower head	0.06 0.07 0.04	20051123/E1-FPBR
France, 2006 (Marathon F1)	EC	0.052	0.012	410 430	2	3	flower head	0.12	20061189/E1-FPBR
Germany, 2005 (Marathon)	EC	0.028	0.0084	290 330	2	7	flower head	0.02	20051123/E1-FPBR
Germany, 2007 (Porthemon)	EC	0.027	0.013	210	2	7	flower head	0.02	20074060/E1-FPBR
Italy, 2008 (Zemosem)	EC	0.050	0.01	500	2	0 1 3	flower head	0.14 0.15 0.09	20074060/E2-FPBR
Spain, 2006 (Peyet)	EC	0.050	0.012	440 420	2	0 1 3	flower head	0.29 0.15 0.08	20061189/E1-FPBR
Spain, 2006 (Peyet)	ME	0.053	0.012	420 430	2	0 1 3	flower head	0.14 0.11 0.08	20061189/E1-FPBR
Spain, 2007 (Green Belt)	EC	0.049 0.044	0.01	510 460	2	3	flower head	< LOD	20074060/E2-FPBR
UK, 2007 (Windsor)	EC	0.025	0.013	200	2	0 3 7	flower head	0.10 0.04 0.03	20074060/E1-FPBR

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for broccoli). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 17 Cypermethrin residues in Brussels sprouts resulting from supervised trials with cypermethrin in Germany, Poland and the UK

BRUSSELS SPROUTS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Germany, 2006 (Maximus)	EC	0.024	0.008	330 310	2	7	sprouts	0.02	20061189/E1-FPBS
Germany, 2006 (Philemon F1)	EC	0.027	0.006	380 420	2	0 3 7	sprouts	0.02 0.02 0.01	20061189/E1-FPBS
Germany, 2006 (Philemon F1)	ME	0.026 0.021	0.006	420 350	2	0 3 7	sprouts	0.02 0.01 0.01	20061189/E1-FPBS
Germany, 2007 (Genius)	EC	0.026	0.013	210	2	0 3 7	sprouts	< 0.01 < 0.01 < 0.01	20074060/E1-FPBS
Germany, 2007 (Genius)	EC	0.029	0.013	220 240	2	7	sprouts	< 0.01	20074060/E1-FPBS
Poland, 2006 (Valencia)	EC	0.026	0.008	310 320	2	7	sprouts	0.01	20061189/E1-FPBS

BRUSSELS SPROUTS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
UK, 2006 (Cirros)	EC	0.025	0.008	300	2	0 3 7	sprouts	0.02 0.02 0.02	20061189/E1-FPBS
UK, 2007 (Exodus)	EC	0.025	0.013	200	2	0 3 7	sprouts	< LOD < LOD < LOD	20074060/E1-FPBS
UK, 2007 (Millenium)	EC	0.025	0.013	200	2	7	sprouts	< 0.01	20074060/E1-FPBS

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for Brussels sprouts). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 18 Cypermethrin residues in head cabbage resulting from supervised trials with cypermethrin in France, Germany, Italy, Spain and the UK

CABBAGE, HEAD	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Adria) head cabbage	EC	0.026	0.0063	430, 410	2	0 3 7	heads	< 0.01 < 0.01 < LOD	20051123/E1-FPCA
France, 2005 (Baiton) head cabbage	EC	0.026	0.0063	410	2	7	heads	< LOD	20051123/E1-FPCA
France, 2006 (Choux de Milan King F1) head cabbage	EC	0.050	0.012	410	2	0 1 3	heads	0.03 0.03 0.03	20061189/E1-FPCA
France, 2006 (Choux de Milan King F1) head cabbage	EC	0.051	0.012	420	2	3	heads	0.02	20061189/E1-FPCA
France, 2007 (Fridee de Milan) head cabbage	EC	0.048 0.053	0.010	480, 530	2	3	heads	0.05	20074060/E2-FPCA
Germany, 2005 (Eton) head cabbage	EC	0.026	0.0083	310	2	0 3 7	heads	0.01 < LOD < LOD	20051123/E1-FPCA
Germany, 2005 (Eton) head cabbage	ME	0.025	0.0086	300	2	0 3 7	heads	< 0.01 < 0.01 < 0.01	20051123/E1-FPCA
Germany, 2005 (Kraut Kaiser) head cabbage	EC	0.026	0.0086	310	2	7	heads	< LOD	20051123/E1-FPCA
Germany, 2007 (Erdeno) head cabbage	EC	0.026	0.012	210	2	0 3 7	heads	< LOD < LOD < LOD	20074060/E1-FPCA
Germany, 2007 (Kraut-Kaiser) head cabbage	EC	0.025	0.012	220, 200	2	7	heads	< LOD	20074060/E1-FPCA
Italy, 2006 (Farao) head cabbage	EC	0.050	0.012	410	2	3	heads	0.01	20061189/E1-FPCA
Italy, 2007 (Reaction) head cabbage	EC	0.050	0.010	500	2	0 1 3	heads	< 0.01 < 0.01 < 0.01	20074060/E2-FPCA

CABBAGE, HEAD	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Italy, 2008 (Royal King) head cabbage	EC	0.052	0.010	520	2	3	heads	0.01	20074060/E2-FPCA
Spain, 2006 (Centinel) head cabbage	EC	0.055 0.060	0.014	400 430	2	0 1 3	heads	0.06 0.07 0.05	20061189/E1-FPCA
Spain, 2006 (Centinel) head cabbage	ME	0.042	0.011	420 390	2	0 1 3	heads	0.07 0.04 0.05	20061189/E1-FPCA
Spain, 2008 (Sentinel) head cabbage	EC	0.050	0.010	500	2	0 1 3	heads	0.01 0.04 0.08	20074060/E2-FPCA
UK, 2007 (Savoy) head cabbage	EC	0.025	0.012	200	2	0 3 7	heads	0.05 0.03 0.03	20074060/E1-FPCA
UK, 2007 (Savoy) head cabbage	EC	0.026	0.013	200	2	7	heads	0.19	20074060/E1-FPCA

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for cabbage). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 19 Cypermethrin residues in cauliflowers resulting from supervised trials with cypermethrin in France, Germany, Italy, Spain and the UK

CAULIFLOWER	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Clapton)	EC	0.026	0.0084	310	2	0 3 7	flower head	0.03 0.01 < 0.01	20051123/E1-FPCF
France, 2005 (Clapton)	ME	0.025	0.0083	300	2	0 3 7	flower head	0.03 0.01 0.01	20051123/E1-FPCF
Germany, 2005 (Clapton)	EC	0.026	0.0084	330 310	2	7	flower head	< LOD	20051123/E1-FPCF
Germany, 2007 (Fremont)	EC	0.026	0.012	210	2	7	flower heads	< 0.01	20074060/E1-FPCF
Germany, 2007 (Fremont)	ME	0.027	0.013	210	2	7	flower heads	< 0.01	20074060/E1-FPCF
Italy, 2006 (Subito)	EC	0.048	0.012	400	2	3	flower heads	0.07	20061189/E1-FPCF
Italy, 2008 (Green Alkan)	EC	0.053 0.051	0.010	530 510	2	3	flower heads	0.04	20074060/E2-FPCF
Spain, 2006 (Avigo)	EC	0.049	0.012	410	2	0 1 3	flower heads	0.02 0.02 < 0.01	20061189/E1-FPCF
Spain, 2006 (Avigo)	ME	0.051	0.012	410	2	0 1 3	flower heads	0.02 < 0.01 < 0.01	20061189/E1-FPCF
Spain, 2008 (Pava de navidad)	EC	0.050 0.052	0.010	500 520	2	0 1 3	flower heads	0.03 < 0.01 < 0.01	20074060/E2-FPCF

CAULIFLOWER	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
UK, 2007 (Nautilus)	EC	0.025	0.013	200	2	0 3 7	flower heads	< 0.01 < 0.01 0.02	20074060/E1-FPCF

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.006 mg/kg for cauliflower). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 20 Cypermethrin residues in melons resulting from supervised trials with cypermethrin in France, Italy and Spain

MELONS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2006 (Anasta)	EC	0.053	0.012	420, 440	2	0 0 0 1 1 1 3 3 3	peel pulp whole melon peel pulp whole melon peel pulp whole melon	0.07 < LOD 0.031[b] 0.09 < LOD 0.033[b] 0.03 < LOD 0.014[b]	20061189/E1-FPME
France, 2007 (Anasta)	EC	0.053	0.01	530	2	0 0 0 1 1 1 3 3 3	fruits peel pulp fruits peel pulp fruits peel pulp	< 0.01 0.02 < LOD < 0.01 0.02 < LOD < LOD 0.02 < LOD	20074060/E1-FPME
Italy, 2006 (Capitol)	EC	0.048	0.012	390	2	3 3 3	peel pulp whole melon	0.057 < LOD 0.018[b]	20061189/E1-FPME
Italy, 2007 (Pregiato)	EC	0.050	0.010	500	2	3	fruits peel pulp	0.01 0.02 < LOD	20074060/E1-FPME
Italy, 2007 (Zatta)	EC	0.050	0.010	500	2	0 0 0 1 1 1 3 3 3	fruits peel pulp fruits peel pulp fruits peel pulp	< 0.01 < 0.01 < LOD < 0.01 < 0.01 < LOD < 0.01 0.01 < LOD	20074060/E1-FPME
Spain, 2006 (Piel de Japo)	EC	0.050	0.012	390, 410	2	3 3 3	peel pulp whole melon	0.01 < LOD 0.005[b]	20061189/E1-FPME

MELONS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Spain, 2007 (Cantaloup)	EC	0.054	0.009	540	2	0 0 0 1 1 1 3 3 3	fruits peel pulp fruits peel pulp fruits peel pulp	0.01 0.03 < LOD 0.01 0.02 < LOD < 0.01 0.01 < LOD	20074060/E1-FPME
Spain, 2007 (Sancho)	EC	0.054	0.010	540	2	3	fruits peel pulp	0.02 0.02 < LOD	20074060/E1-FPME
Spain, 2007 (Sancho)	EC	0.054	0.010	540	2	3	fruits peel pulp	< 0.01 < 0.01 < LOD	20074060/E1-FPME

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for melons). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

[b] Residue value for whole melon calculated from measured values on peel and pulp.

Table 21 Cypermethrin residues in okra resulting from supervised trials with cypermethrin in Thailand

OKRA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 1998	EC	0.081	0.011	720	5	0 1 3 5 7 10 15	fruit (pod)	0.74 0.29 0.14 0.02 < 0.01 < 0.01 < 0.01	CY-OK-01
Thailand, 2000	EC	0.077	0.011	680	5	0 1 3 5 7 10 15	fruit (pod)	0.54 0.27 0.10 0.01 < 0.01 < 0.01 < 0.01	CY-OK-02
Thailand, 2002	EC	0.084	0.011	750	4	0 1 3 5 7 9 15 20	fruit (pod)	2.5 0.57 0.10 0.05 0.03 0.01 < 0.01 < 0.01	CY-OK-03
Thailand, 2004	EC	0.084	0.011	750	4	0 1 3 5 7 9 15 20	fruit (pod)	1.5 0.62 0.10 0.18 0.13 0.04 < 0.01 < 0.01	CY-OK-04

OKRA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 2004	EC	0.084	0.011	750	4	0 1 3 5 7 9 15 20	fruit (pod)	2.7 1.4 0.60 <u>0.20</u> 0.06 0.01 < 0.01 < 0.01	CY-OK-05
Thailand, 2004	EC	0.084	0.011	750	4	0 1 3 5 7 9 15 20	fruit (pod)	1.1 0.75 0.48 <u>0.11</u> 0.02 < 0.01 < 0.01 < 0.01	CY-OK-06

Table 22 Cypermethrin residues in chilli peppers resulting from supervised trials with cypermethrin in Thailand

CHILLI PEPPERS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 1996	EC	0.13	0.019	700	4	0 1 3 5 7 10	chilli peppers	0.61 0.55 0.50 0.41 <u>0.25</u> 0.08	CY-CH-01
Thailand, 1997	EC	0.14	0.019	760	4	0 1 3 5 7 10	chilli peppers	1.1 0.92 0.71 0.42 <u>0.24</u> 0.14	CY-CH-02
Thailand, 2004	EC	0.14	0.019	720	3	0 1 3 5 7	chilli peppers	0.92 0.75 0.62 0.54 <u>0.54</u>	CY-CH-03
Thailand, 2004	EC	0.15	0.019	770	3	0 1 3 5 7	chilli peppers	1.1 1.0 0.97 0.42 <u>0.45</u>	CY-CH-04
Thailand, 2004	EC	0.12	0.019	650	3	0 1 3 5 7 9 12 15	chilli peppers	0.94 1.0 0.82 0.63 <u>0.69</u> 0.50 0.47 0.41	CY-CH-05

CHILLI PEPPERS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 2004	EC	0.17	0.019	880	3	0 1 3 5 7 9 12 15	chilli peppers	1.1 1.0 0.67 0.58 0.62 0.51 0.53 0.43	CY-CH-06

Table 23 Cypermethrin residues in tomatoes resulting from supervised trials with cypermethrin in France, Italy and Spain

TOMATOES	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Hector)	EC	0.052	0.013	400	2	0 1 3	tomatoes	< 0.01 < 0.01 < LOD	20051123/E1-FPTO
France, 2006 (Cobra)	EC	0.050	0.012	410	2	0 1 3	tomatoes	0.02 0.01 0.01	20061189/E1-FPTO
France, 2006 (Ondiva)	EC	0.048	0.012	400	2	3	tomatoes	0.03	20061189/E1-FPTO
Italy, 2005 (Magnum)	EC	0.046	0.011	400	2	3	tomatoes	0.02	20051123/E1-FPTO
Spain, 2005 (Elegi)	EC	0.048 + 0.043	0.011 + 0.011	420 + 380	2	3	tomatoes	0.04	20051123/E1-FPTO
Spain, 2006 (La Pera)	EC	0.051	0.016	320	2	3	tomatoes	0.02	20061189/E1-FPTO
Spain, 2006 (La Pera)	ME	0.052	0.016	310	2	3	tomatoes	0.03	20061189/E1-FPTO
Spain, 2006 (variety?)	EC	0.050	0.016	310	2	0 1 3	tomatoes	0.01 < 0.01 < 0.01	20061189/E1-FPTO

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for tomatoes). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 24 Cypermethrin residues in lettuce resulting from supervised trials with cypermethrin in France, Germany, Greece, Italy and Spain

LETTUCE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2005 (Appia) head lettuce	EC	0.033	0.0101	320	2	7	heads	0.13	20051123/E1-FPHL
France, 2005 (Canion E13.75.34) head lettuce	EC	0.033	0.008	410 440	2	0 3 7	heads	0.75 0.64 0.11	20051123/E1-FPHL
France, 2005 (Canion E13.75.34) head lettuce	ME	0.032	0.007	420 430	2	0 3 7	heads	0.88 0.54 0.16	20051123/E1-FPHL

LETTUCE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2005 (Lollo rosa) head lettuce	EC	0.047	0.011	420	2	3	heads	1.1	20051123/E2-FPHL
France, 2006 (Klausia) head lettuce	EC	0.051	0.012	420	2	0 1 3	heads	1.8 2.0 1.7	20061189/E1-FPHL
France, 2006 (Muzak) head lettuce	EC	0.049	0.012	410	2	0 1 3	heads	1.2 0.95 0.74	20061189/E1-FPHL
Germany, 2005 (Matilda) head lettuce	EC	0.029 0.032	0.0101	280 320	2	0 3 7	heads	0.50 0.26 0.12	20051123/E1-FPHL
Germany, 2005 (Ponchito) head lettuce	EC	0.031	0.0101	310	2	7	heads	0.03	20051123/E1-FPHL
Greece, 2007 (Atraxion) leaf lettuce	EC	0.054 0.047	0.01	530 470	2	0 1 3	heads	1.3 0.91 1.3	20074060/E1-FPLE
Greece, 2007 (Black Simpson) leaf lettuce	EC	0.047 0.053	0.01	470 530	2	3	heads	2.0	20074060/E1-FPLE
Greece, 2007 (Black Simpson) leaf lettuce	ME	0.046 0.052	0.01	470 540	2	3	heads	0.55	20074060/E1-FPLE
Italy, 2005 (Impulsion) head lettuce	EC	0.046	0.011	400	2	3	heads	0.27	20051123/E2-FPHL
Italy, 2006 (Impulsion) head lettuce	EC	0.050	0.012	410	2	3	heads	0.49	20061189/E1-FPHL
Spain, 2005 (Romana) head lettuce	EC	0.048	0.011	430	2	0 1 3	heads	0.71 0.50 0.43	20051123/E2-FPHL
Spain, 2005 (Romana) head lettuce	ME	0.047	0.011	420	2	0 1 3	heads	0.74 0.50 0.36	20051123/E2-FPHL
Spain, 2006 (Candela) head lettuce	EC	0.050	0.012	420	2	3	heads	0.65	20061189/E1-FPHL
Spain, 2006 (Candela) head lettuce	ME	0.53	0.012	410 430	2	3	heads	0.29	20061189/E1-FPHL
Spain, 2006 (Romana) head lettuce	EC	0.050	0.012	420 410	2	0 1 3	heads	1.1 0.77 0.61	20061189/E1-FPHL
Spain, 2007 (Tordesillas) leaf lettuce	EC	0.052	0.01	520	2	3	heads	0.75	20074060/E1-FPLE

Table 25 Cypermethrin residues in spinach resulting from supervised trials with cypermethrin in France, Germany, Italy and Spain

SPINACH	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2006 (Geant d'hiver)	EC	0.049	0.012	400	2	1 3	foliage	1.7 1.4	20061189/E1-FPSP

SPINACH	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2006 (Puma)	EC	0.026	0.008	300, 320	2	3 7	foliage	0.96 0.50	20061189/E1-FPSP
Germany, 2006 (Zansibar)	EC	0.023	0.008	270	2	0 3 7	foliage	0.92 0.72 0.45	20061189/E1-FPSP
Germany, 2006 (Zansibar)	ME	0.024	0.008	320, 290	2	0 3 7	foliage	0.76 0.48 0.34	20061189/E1-FPSP
Italy, 2007 (Mustang)	EC	0.051	0.010	510	2	3	foliage	1.0	20074060/E1-FPSP
Italy, 2007 (Mustang)	ME	0.051	0.010	510	2	3	foliage	0.65	20074060/E1-FPSP
Spain, 2006 (Spiros F1)	EC	0.059	0.015	390, 380	2	0 1 3	foliage	3.6 2.2 2.1	20061189/E1-FPSP
Spain, 2006 (Spiros F1)	ME	0.044	0.011	420, 400	2	0 1 3	foliage	1.7 1.3 1.0	20061189/E1-FPSP
Spain, 2007 (Spiros 51)	EC	0.052 0.048	0.010	540 500	2	0 1 3	foliage	1.7 1.4 1.2	20074060/E1-FPSP

Table 26 Cypermethrin residues in peas resulting from supervised trials with cypermethrin in France, Germany and Spain

PEAS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Lumina)	EC	0.025	0.0084	300	2	14	whole pods dry peas	0.09 < LOD	20051123/E2-FPPS
France, 2005 (Nain d'Annonay)	EC	0.027	0.008	310 330	2	0 0 0 3 3 3 7 7 7	fresh pods empty pods peas fresh pods empty pods peas fresh pods empty pods peas	0.11 0.11 < LOD 0.11 0.11 < LOD 0.06 0.09 < 0.01	20051123/E1-FPPS
France, 2005 (Nain d'Annonay)	ME	0.026	0.008	310	2	0 0 0 3 3 3 7 7 7	fresh pods empty pods peas fresh pods empty pods peas fresh pods empty pods peas	0.12 0.11 < LOD 0.10 0.10 < LOD 0.05 0.09 < 0.01	20051123/E1-FPPS
France, 2006 (Bakara)	EC	0.025	0.013	210 200	2	7	fresh pods empty pods peas	0.02 0.08 < LOD	20061189/E1-FPPG
France, 2006 (Bakara)	ME	0.027	0.012	220	2	7	fresh pods empty pods peas	0.03 0.11 < LOD	20061189/E1-FPPG

PEAS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2006 (Hardy)	EC	0.025	0.012	210	2	14	whole pods dry peas	0.27 < LOD	20061189/E1-FPPD
Germany, 2005 (Santana)	EC	0.027	0.0063	420	2	0 3 7 10 14	whole pods	0.02 < 0.01 0.01 0.01 < 0.02	20051123/E2-FPPS
Germany, 2005 (Santana)	EC	0.027	0.0063	420	2	0 3 7 10 14	dry peas	< LOD < LOD < LOD < LOD < LOD	20051123/E2-FPPS
Germany, 2005 (Sugar Bone)	EC	0.025	0.008	320 300	2	7	fresh pods empty pods peas	0.02 0.03 < LOD	20051123/E1-FPPS
Germany, 2006 (Santana)	EC	0.024	0.008	290	2	0 3 7 10 14	whole pods	0.12 0.16 0.09 0.12 0.13	20061189/E1-FPPD
Germany, 2006 (Santana)	EC	0.024	0.008	290	2	0 3 7 10 14	peas peas peas peas dry peas	< LOD < LOD < LOD < LOD < LOD	20061189/E1-FPPD
Germany, 2006 (Sugar Bone)	EC	0.024	0.008	330 300	2	0 0 0 3 3 3	fresh pods empty pods peas fresh pods empty pods peas	0.05 0.18 < LOD 0.06 0.16 < LOD	20061189/E1-FPPG
Spain, 2006 (Utrillo)	EC	0.048	0.012	420 400	2	0 0 0 1 1 1 3 3 3	fresh pods empty pods peas fresh pods empty pods peas fresh pods empty pods peas	0.13 0.14 < LOD 0.13 0.21 < LOD 0.05 0.07 < LOD	20061189/E1-FPPG

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for peas). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 27 Cypermethrin residues in beans resulting from supervised trials with cypermethrin in France, Germany, Greece, Italy, Spain and the UK

BEANS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2005 (Caillard Hincot Nain Aramis 17385)	EC	0.026	0.008	310	2	0 3 7	fresh pods	0.16 0.08 0.06	20051123/E1-FPBE
France, 2005 (Oxinef)	EC	0.027	0.008	330	2	7	fresh pods	0.03	20051123/E1-FPBE

BEANS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2006 (Contender)	EC	0.046	0.019	270, 240	2	0 1 3	fresh pods	0.06 0.04 0.02	20061189/E1-FPGB
France, 2006 (Contender)	ME	0.048	0.020	250, 240	2	0 1 3	fresh pods	0.02 0.02 0.01	20061189/E1-FPGB
France, 2007 (Yukon)	EC	0.026	0.012	210	2	7	fresh pods	0.01	20074060/E2-FPGB
Germany, 2005 (Crooper Teepe)	EC	0.027	0.008	340 320	2	7	fresh pods	0.04	20051123/E1-FPBE
Germany, 2005 (Mencayo)	EC	0.025	0.008	300	2	0 3 7	fresh pods	0.07 0.05 0.04	20051123/E1-FPBE
Germany, 2005 (Mencayo)	ME	0.025	0.008	300	2	0 3 7	fresh pods	0.04 0.03 0.06	20051123/E1-FPBE
Germany, 2007 (Classic)	EC	0.028	0.013	220	2	7	fresh pods	0.02	20074060/E2-FPGB
Greece, 2007 (Maestro)	EC	0.050	0.01	500	2	3	fresh pods	0.02	20074060/E1-FPGB
Italy, 2006 (Avalon)	EC	0.049	0.012	400	2	0 1 3	fresh pods	0.04 0.05 0.02	20061189/E1-FPGB
Spain, 2006 (Cleo)	EC	0.048	0.016	300	2	3	fresh pods	0.02	20061189/E1-FPGB
Spain, 2006 (Prime1)	EC	0.051	0.016	320	2	3	fresh pods	0.02	20061189/E1-FPGB
Spain, 2007 (Sabinal)	EC	0.051 0.046	0.01	530 480	2	3	fresh pods	0.02	20074060/E1-FPGB
Spain, 2007 (Troncon)	EC	0.051	0.01	500	2	0 1 3	fresh pods	0.03 0.02 0.03	20074060/E1-FPGB
UK, 2007 (Paulista)	EC	0.025	0.013	200	2	0 3 6	fresh pods	0.01 0.01 < 0.01	20074060/E2-FPGB

Table 28 Cypermethrin residues in carrots resulting from supervised trials with cypermethrin in France, Germany, Greece, Spain and the UK.

CARROT	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2006 (Chambor)	EC	0.052	0.011	440 470	2	0 1 3	carrots	0.01 0.01 < 0.01	20061189/E1-FPCR
France, 2006 (Chambor)	ME	0.047	0.011	440 420	2	0 1 3	carrots	0.01 0.01 < 0.01	20061189/E1-FPCR
France, 2006 (Solo)	EC	0.050 0.041	0.023	220 180	2	7	carrots	< LOD	20061189/E1-FPCR

CARROT	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2007 (Chambord)	EC	0.045	0.024	190	2	0 1 3	carrots	< 0.01 < 0.01 < LOD	20074060/E2-FPCR
France, 2007 (Maestro)	EC	0.053	0.025	210	2	3	carrots	< 0.01	20074060/E2-FPCR
Germany, 2007 (Meastro F1)	EC	0.025	0.013`	200	2	0 3 7	carrots	< LOD < LOD < LOD	20074060/E1-FPCR
Germany, 2007 (Purple Haze)	EC	0.027	0.011	220	2	7	carrots	< LOD	20074060/E1-FPCR
Germany, 2007 (Titus)	EC	0.027	0.013	210	2	7	carrots	< LOD	20074060/E1-FPCR
Greece, 2007 (Bolero)	EC	0.053	0.025	210	2	3	carrots	0.01	20074060/E2-FPCR
Greece, 2007 (Megane)	EC	0.052	0.025	210	2	0 1 3	carrots	0.02 0.01 0.01	20074060/E2-FPCR
Spain, 2007 (Bangor)	EC	0.048 0.055	0.025	190 220	2	0 1 3	carrots	< 0.01 0.02 < 0.01	20074060/E2-FPCR
Spain, 2007 (Maestro)	EC	0.054	0.025	220	2	3	carrots	< 0.01	20074060/E2-FPCR
UK, 2007 (Nairobi)	EC	0.025	0.013	200	2	0 3 7	carrots	< LOD < LOD < LOD	20074060/E1-FPCR
UK, 2007 (Nepal)	EC	0.025	0.013	200	2	0 3 7	carrots	< LOD < LOD < LOD	20074060/E1-FPCR
UK, 2007 (Torro)	EC	0.025	0.012	200	2	7	carrots	< LOD	20074060/E1-FPCR

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for carrots). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 29 Cypermethrin residues in potatoes resulting from supervised trials with cypermethrin in France, Germany, Poland and Spain

POTATO	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Elodie)	EC	0.027	0.0063	410 430	2	7	tubers	< LOD	20051123/E1-FPPO
France, 2005 (Elodie)	ME	0.026	0.0062	400 430	2	7	tubers	< LOD	20051123/E1-FPPO
France, 2006 (Monalisa)	EC	0.052	0.012	400 430	2	3	tubers	< LOD	20061189/E1-FPPO
France, 2006 (Monalisa)	ME	0.048 0.052	0.012	380 430	2	3	tubers	< LOD	20061189/E1-FPPO
Germany, 2005 (Cilena)	EC	0.026	0.0084	310	2	0 3 7	tubers	< LOD < LOD < LOD	20051123/E1-FPPO
Germany, 2006 (Kuras)	EC	0.025	0.008	270 310	2	7	tubers	< LOD	20061189/E1-FPPO

POTATO	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Germany, 2006 (Kuras)	ME	0.027	0.008	330	2	7	tubers	< LOD	20061189/E1-FPPO
Greece, 2007 (Spunda)	EC	0.050 0.047	0.010	500 470	2	0 1 3	tubers	< LOD < LOD < LOD	20074060/E1-FPPO
Poland, 2006 (Rumpel)	EC	0.024	0.008	300	2	0 3 7	tubers	< LOD < LOD < LOD	20061189/E1-FPPO
Spain, 2006 (Spunta)	EC	0.052	0.012	410 430	2	0 3 7	tubers	< LOD < LOD < LOD	20061189/E1-FPPO
Spain, 2007 (Mona Lisa)	EC	0.051 0.048	0.010	530 500	2	3	tubers	< LOD	20074060/E1-FPPO
Spain, 2007 (Mona Lisa)	ME	0.052	0.010	520	2	3	tubers	< 0.01	20074060/E1-FPPO

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for potatoes). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 30 Cypermethrin residues in sugar beet resulting from supervised trials with cypermethrin in Italy, Poland, Spain and the UK

SUGAR BEET	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Italy, 2005 (Opera)	EC	0.047	0.013	410	2	14	roots	< LOD	20051123/E1-FPSB
Italy, 2006 (California)	EC	0.048	0.012	400	2	0 3 7 10 14	roots	< LOD < LOD < LOD < LOD < LOD	20061189/E1-FPSB
Poland, 2007 (Soplica)	EC	0.049 0.054	0.025	210	2	0 3 7 10 14	roots	< 0.01 < 0.01 < 0.01 0.01 < 0.01	20074060/E1-FPSB
Spain, 2005 (Heracles)	EC	0.047	0.011	410	2	0 3 7 10 14	roots	< LOD c0.02 < LOD < LOD < LOD < LOD	20051123/E1-FPSB
Spain, 2006 (Loanna)	EC	0.052	0.016	320	2	14	roots	< LOD	20061189/E1-FPSB
UK, 2007 (Mars)	EC	0.050	0.025	200	2	14	roots	< 0.01	20074060/E1-FPSB
UK, 2007 (variety not stated)	EC	0.050	0.025	200	2	0 3 7 10 14	roots	< 0.01 < 0.01 < 0.01 < 0.01 < LOD	20074060/E1-FPSB

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for sugar beets). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg. c: sample from untreated control plot.

Table 31 Cypermethrin residues in artichokes resulting from supervised trials with cypermethrin in France and Spain

ARTICHOKE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2006 (Makko)	EC	0.047	0.012	390	2	3	flower heads	0.26	20061189/E1-FPAR
France, 2006 (Makko)	ME	0.049	0.012	400	2	3	flower heads	0.29	20061189/E1-FPAR
France, 2006 (Mako)	EC	0.045	0.011	400	2	3	flower heads	0.17	20051123/E1-FPAR
Spain, 2006 (Benicarlo)	EC	0.046	0.015	310	2	0 1 3	flower heads	0.12 0.08 0.03	20051123/E1-FPAR
Spain, 2006 (Benicarlo)	ME	0.045	0.015	300	2	0 1 3	flower heads	0.10 0.05 0.05	20051123/E1-FPAR
Spain, 2006 (Blanca de Toleda)	EC	0.050	0.012	420	2	0 1 3	flower heads	0.015 0.13 0.10	20061189/E1-FPAR

Table 32 Cypermethrin residues in asparagus resulting from supervised trials with cypermethrin in Thailand

ASPARAGUS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 1995	EC	0.094	0.0075	1250	4	0 1 3 5 8	Asparagus spears	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	CY-AS-01
Thailand, 1996	EC	0.12	0.0075	1600	4	0 1 3 5 7 10	Asparagus spears	0.53 0.33 0.05 < 0.01 < 0.01 < 0.01	CY-AS-02
Thailand, 2003	EC	0.19	0.025	760	4	0 1 3 5 7 10	Asparagus spears	0.57 0.47 <u>0.18</u> < 0.01 < 0.01 < 0.01	CY-AS-03
Thailand, 2003	EC	0.19	0.025	780	4	0 1 3 5 7 10	Asparagus spears	0.78 0.46 <u>0.06</u> < 0.01 < 0.01 < 0.01	CY-AS-04
Thailand, 2004	EC	0.13	0.011	1150	4	0 1 3 5 7	Asparagus spears	0.06 0.02 0.01 < 0.01 < 0.01	CY-AS-05

ASPARAGUS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Thailand, 2004	EC	0.12	0.011	1050	4	0 1 3 5 7	Asparagus spears	0.03 0.01 0.01 < 0.01 < 0.01	CY-AS-06

Table 33 Cypermethrin residues in barley resulting from supervised trials with cypermethrin in France, Greece, Hungary, Poland, Spain and the UK

BARLEY	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2007 (Nickel)	EC	0.029	0.008	370	1	0 7 14 21 28	ears ears ears ears barley grain	0.71 0.41 0.24 0.31 0.05	20074062/E1-FPBA
France, 2007 (Platine)	EC	0.032	0.010	310	1	28	barley grain	0.09	20074062/E1-FPBA
France, 2007 (Prestige)	EC[a]	0.042	0.010	410	1	28	barley grain	0.08	20074062/E2-FPBA
France, 2007 (Prestige)	EC[a]	0.042	0.021	200	1	0 7 14 21 28	ears ears ears ears barley grain	1.2 0.58 0.52 0.79 0.07	20074062/E2-FPBA
Greece, 2007 (Arta)	EC[a]	0.041	0.014	300	1	0 7 14 21 28	ears ears ears ears barley grain	0.86 0.32 0.33 0.47 0.06	20074062/E2-FPBA
Greece, 2007 (Arta)	EC[a]	0.042	0.014	300	1	28	barley grain	0.03	20074062/E2-FPBA
Greece, 2007 (Kares)	EC[a]	0.043	0.014	310	1	28	barley grain	0.02	20074062/E2-FPBA
Hungary, 2007 (KH Tural)	EC	0.032	0.010	310	1	0 7 14	ears ears ears	0.20 0.22 0.16	20074062/E1-FPBA
Hungary, 2007 (Nelly)	EC	0.029	0.010	280	1	28	barley grain	0.12	20074062/E1-FPBA
Poland, 2007 (Kroton)	EC	0.032	0.010	310	1	0 7 14 21 28	ears ears ears ears barley grain	0.70 0.46 0.48 0.31 0.19	20074062/E1-FPBA
Poland, 2007 (Lomerit)	EC	0.034	0.010	320	1	28	barley grain	0.05	20074062/E1-FPBA
Spain, 2007 (Beckam)	EC[a]	0.045	0.021	220	1	28	barley grain	0.03	20074062/E2-FPBA

BARLEY	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Spain, 2007 (Scarlen)	EC[a]	0.044	0.020	220	1	0 7 14 21 28	ears ears ears ears barley grain	2.4 0.76 0.50 0.29 0.04	20074062/E2-FPBA
Spain, 2007 (unnamed)	EC[a]	0.044	0.020	220	1	0 7 14 21 28	ears ears ears ears barley grain	1.6 1.7 1.05 0.63 0.18	20074062/E2-FPBA
UK, 2007 (Optic)	EC	0.031	0.015	200	1	28	barley grain	0.11	20074062/E1-FPBA
UK, 2007 (Safron)	EC	0.032	0.016	200	1	0 7 14 21 29	ears ears ears ears barley grain	1.4 0.56 0.48 0.30 0.10	20074062/E1-FPBA

[a] Formulation contains chlorpyrifos + cypermethrin. Chlorpyrifos data are not included in this evaluation.

Table 34 Cypermethrin residues in maize resulting from supervised trials with cypermethrin in France, Germany, Spain and the UK

MAIZE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		Cypermethrin[a]	
France, 2005 (Constantino)	EC	0.062 0.067	0.015	410 450	2	29	maize kernels	< LOD	20051123/E1-FPMA
France, 2005 (LR33y65 PR33y45 fitic)	EC	0.066 0.059	0.015	440 390	2	62	maize kernels	< LOD	20051123/E1-FPMA
France, 2006 (Magistral)	EC	0.059	0.029	200	2	76	maize kernels	< LOD	20061189/E1-FPMA
Germany, 2006 (Birko)	EC	0.065	0.020	300 320	2	68	maize kernels	< LOD	20061189/E1-FPMA
Germany, 2007 (Oldham)	EC	0.072	0.024	300	2	75	maize kernels	< LOD	20074060/E1-FPMA
Spain, 2005 (DKC-6575)	EC	0.062	0.015	410	2	89	maize kernels	< LOD	20051123/E1-FPMA
UK, 2007 (Crown)	EC	0.076 0.074	0.037 0.025	200 300	2	81	maize kernels	< LOD	20074060/E1-FPMA
UK, 2007 (Lincon)	EC	0.078 0.076	0.038 0.025	210 310	2	77	maize kernels	< LOD	20074060/E1-FPMA

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for kernels). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 35 Cypermethrin residues in wheat resulting from supervised trials with cypermethrin in France, Germany, Greece, Hungary, Poland, Spain and the UK

WHEAT	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2007 (Joyaux)	EC[b]	0.042	0.020	200	1	28	wheat grain	0.01	20074062/E2-FPWH
France, 2007 (Quality)	EC[b]	0.034	0.017	200	1	0 7 14 21 28	ears ears ears ears wheat grain	0.70 0.31 0.67 < 0.01 0.04	20074062/E2-FPWH
Germany, 2007 (Cubus)	EC[b]	0.032	0.010	310	1	28	wheat grain	< 0.01	20074062/E1-FPWH
Germany, 2007 (Turkis)	EC[b]	0.029	0.010	280	1	0 7 14 22 28	ears ears ears ears wheat grain	0.26 0.12 0.12 0.10 < LOD	20074062/E1-FPWH
Greece, 2007 (Bronde)	EC[b]	0.043	0.014	310	1	27	wheat grain	< 0.01	20074062/E2-FPWH
Greece, 2007 (Estero)	EC[b]	0.042	0.014	300	1	0 7 14 21 28	ears ears ears ears wheat grain	0.44 0.26 0.18 0.19 < 0.01	20074062/E2-FPWH
Greece, 2007 (Mesapia)	EC[b]	0.043	0.014	310	1	27	wheat grain	< LOD	20074062/E2-FPWH
Hungary, 2007 (MV Ködmön)	EC[b]	0.033	0.010	320	1	0 7 14 21 28	ears ears ears ears wheat grain	0.19 0.19 < LOD < 0.01 < 0.01	20074062/E1-FPWH
Hungary, 2007 (MV Suba)	EC[b]	0.032	0.010	310	1	28	wheat grain	< LOD	20074062/E1-FPWH
Poland, 2007 (Roma)	EC[b]	0.033	0.011	310	1	28	wheat grain	< LOD	20074062/E1-FPWH
Poland, 2007 (Skawa)	EC[b]	0.031	0.010	300	1	0 7 14 21 28	ears ears ears ears wheat grain	< LOD 0.47 0.55 0.27 0.02	20074062/E1-FPWH
Spain, 2007 (Califa)	EC[b]	0.039	0.021	190	1	0 7 14 21 28	ears ears ears ears wheat grain	0.73 0.49 0.27 0.21 < 0.01	20074062/E2-FPWH
Spain, 2007 (Chamorro)	EC[b]	0.039	0.021	190	1	0 7 14 21 28	ears ears ears ears wheat grain	0.78 0.44 0.68 0.21 < 0.01	20074062/E2-FPWH
Spain, 2007 (Chamorro)	EC[b]	0.044	0.020	220	1	28	wheat grain	< LOD	20074062/E2-FPWH

WHEAT	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
UK, 2007 (Access)	EC[b]	0.031	0.010	300	1	0 7 14 21 28	ears ears ears ears wheat grain	0.05 0.22 0.19 0.03 0.02	20074062/E1-FPWH
UK, 2007 (Einstein)	EC[b]	0.031	0.010	300	1	28	wheat grain	0.01	20074062/E1-FPWH

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for ears and wheat grain). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

[b] Formulation contains chlorpyrifos + cypermethrin. Chlorpyrifos data are not included in this evaluation.

Table 36 Cypermethrin residues in wheat resulting from supervised post-harvest treatment trials with cypermethrin in Belgium

WHEAT	Application			Conditions	Interval	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/t	no.		days after treatment		cypermethrin	
Belgium, 2005 (Lancelot)	UL[a]	1.7	1	12 kg wheat treated, moisture 13.8%, stored in storage barrel at 10 ˚C	1 7 90 180 270	wheat grain	1.2 1.5 1.4 1.3 1.3	21048/1
Belgium, 2005 (Tremie)	UL[a]	1.7	1	20 kg wheat treated, moisture 13.6% stored in storage barrel at 10 ˚C	1 7 90 180 270	wheat grain	1.11 1.07 1.04 0.96 0.99	21048/2
Belgium, 2005 (Argos)	UL[a]	1.7	1	12 kg wheat treated, moisture 15.5%	1 7	wheat grain	1.35 1.30	21048/3
Belgium, 2005 (Apache)	UL[a]	1.7	1	20 kg wheat treated, moisture 15.1%	1 7	wheat grain	1.17 1.40	21048/4

[a] UL formulation of cypermethrin 20 g/L and piperonyl butoxide 57 g/L. Piperonyl butoxide residue data also reported, but not included in this evaluation.

Table 37 Cypermethrin residues in cotton seed resulting from supervised trials with cypermethrin in Greece and Spain

COTTON SEED	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Greece, 2005 (Fantom)	EC	0.050 0.053	0.013	390 420	2	7 14 21	lint	1.5 1.3 0.65	20051123/E1-FPCO
Greece, 2005 (Fantom)	EC	0.050 0.053	0.013	390 420	2	7 14 21	cotton seed	< LOD < LOD < LOD	20051123/E1-FPCO

COTTON SEED	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Greece, 2006 (Andromeda)	EC	0.049	0.012	400	2	0 3 7 14 21	lint	3.5 0.91 1.3 0.47 0.67	20061189/E1-FPCO
Greece, 2006 (Andromeda)	EC	0.049	0.012	400	2	0 3 7 14 21	cotton seed	< LOD < LOD < LOD < LOD < LOD	20061189/E1-FPCO
Greece, 2007 (Celia)	EC	0.053	0.010	520	2	21	lint	0.50	20074060/E1-FPCO
Greece, 2007 (Celia)	EC	0.053	0.010	520	2	21	cotton seed	< LOD	20074060/E1-FPCO
Greece, 2007 (Volcano)	EC	0.047 0.050	0.010	470 500	2	0 3 7 14 21	cotton seed	< 0.05 < LOD < LOD < LOD < LOD	20074060/E1-FPCO
Greece, 2007 (Volcano)	EC	0.047 0.050	0.010	470 500	2	0 3 7 14 21	lint	1.9 1.4 0.50 0.49 0.38	20074060/E1-FPCO
Spain, 2005 (Celia)	EC	0.055 0.049	0.013	440 390	2	21	cotton seed	< LOD	20051123/E1-FPCO
Spain, 2005 (Celia)	EC	0.055 0.049	0.013	440 390	2	21	lint	0.20	20051123/E1-FPCO
Spain, 2006 (Celia)	EC	0.049	0.016	300	2	21	lint	0.33	20061189/E1-FPCO
Spain, 2006 (Celia)	EC	0.049	0.016	300	2	21	cotton seed	< LOD	20061189/E1-FPCO
Spain, 2007 (Alpina)	EC	0.043	0.010	500	2	21	cotton seed	< LOD	20074060/E1-FPCO
Spain, 2007 (Alpina)	EC	0.043	0.010	500	2	21	lint	0.46	20074060/E1-FPCO
Spain, 2007 (Celia)	EC	0.048	0.010	500	2	0 3 7 14 21	lint	3.0 2.1 0.75 0.48 0.23	20074060/E1-FPCO
Spain, 2007 (Celia)	EC	0.048	0.010	500	2	0 3 7 14 21	cotton seed	< LOD < LOD < LOD < LOD < LOD	20074060/E1-FPCO

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.015 mg/kg for cotton seed). Residues detected but below LOQ (0.05 mg/kg), are listed as < 0.01 mg/kg.

Table 38 Cypermethrin residues in rape seed resulting from supervised trials with cypermethrin in France, Greece and Spain

RAPE SEED	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2007 (Hybristar)	EC	0.025	0.006	400	2	21	rape seed	< 0.01	20074058/E1-FPRA
France, 2007 (Standard)	EC	0.026	0.007	400	2	0 3 7 14 21	pods pods pods pods rape seed	0.51 0.50 0.37 0.34 0.01	20074058/E1-FPRA
France, 2007 (Standard)	EC	0.026	0.007	400	2	0 3 7 14	plants without pods pods plants without pods pods plants without pods	0.40 0.17 0.10 0.04	20074058/E1-FPRA
Greece, 2007 (ES Betty)	EC	0.025	0.006	400	2	0 3 7 14 21	pods pods pods pods rape seed	0.51 0.26 0.38 0.31 < LOD	20074058/E1-FPRA
Greece, 2007 (ES Betty)	EC	0.025	0.006	400	2	0 3 7 14	plants without pods pods plants without pods pods plants without pods pods plants without pods pods	0.14 0.11 0.03 0.02	20074058/E1-FPRA
Greece, 2007 (ES Betty)	EC	0.025	0.006	400	2	21	rape seed rape seed, processor press cake rape oil, crude	< LOD < LOD < LOD < LOD	20074058/E1-FPRA
Greece, 2007 (Lycodor)	EC	0.025	0.006	400	2	21	rape seed rape seed, processor press cake rape oil, crude	< LOD < LOD < LOD < LOD	20074058/E1-FPRA
Greece, 2007 (Lycodor)	EC	0.026	0.006	410	2	21	rape seed	< LOD	20074058/E1-FPRA
Spain, 2007 (Hellan)	EC	0.025	0.008	300	2	21	rape seed rape seed, processor press cake rape oil, crude	< LOD 0.01 < 0.01 < LOD	20074058/E1-FPRA
Spain, 2007 (Kabel)	EC	0.026	0.009	300	2	0 3 7 14 21	pods pods pods pods rape seed	0.50 0.65 0.26 0.05 < 0.01	20074058/E1-FPRA
Spain, 2007 (Kabel)	EC	0.026	0.009	300	2	21	rape seed rape seed, processor press cake rape oil, crude	< 0.01 0.01 < 0.01 < LOD	20074058/E1-FPRA

RAPE SEED	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Spain, 2007 (Kabel)	EC	0.026	0.009	300	2	0 3 7 14	plants without pods plants without pods plants without pods plants without pods	0.38 0.23 0.36 0.24	20074058/E1-FPRA

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for seeds, pods, crude rape oil). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 39 Cypermethrin residues in alfalfa resulting from supervised trials with cypermethrin in France and Spain

ALFALFA	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Flandre)	EC	0.047	0.011	440 410	2	0 3 7	green matter	1.4 1.8 0.75	20051123/E1-FPAL
France, 2005 (Tango)	EC	0.050	0.011	440	2	7	green matter	3.0	20051123/E1-FPAL
France, 2006 (Flandre)	EC	0.045	0.011	420 410	2	0 3 7	green matter	4.4 4.9 2.0	20061189/E1-FPAL
France, 2006 (Flandre)	EC	0.048 0.043	0.011	440 400	2	7	green matter	1.7	20061189/E1-FPAL
Spain, 2005 (Aurom)	EC	0.049	0.011	430	2	7	green matter	0.93	20051123/E1-FPAL
Spain, 2005 (variety not recorded)	EC	0.047	0.011	420	2	0 3 7	green matter	2.1 1.4 1.6	20051123/E1-FPAL
Spain, 2006 (Aurora)	EC	0.042	0.011	390	2	0 3 7	green matter	2.7 1.8 1.6	20061189/E1-FPAL
Spain, 2006 (Aurora)	EC	0.045	0.011	410	2	7	green matter	1.6	20061189/E1-FPAL

Table 40 Cypermethrin residues in pea fodder and forage resulting from supervised trials with cypermethrin in France and Germany

PEA FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Lumina)	EC	0.025	0.0084	300	2	14	pea straw	1.4	20051123/E2-FPPS
France, 2006 (Hardy)	EC	0.025	0.012	210	2	14	pea straw	2.6	20061189/E1-FPPD

PEA FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Germany, 2005 (Santana)	EC	0.027	0.0063	420	2	0 3 7 10 14	plants without pods plants without pods plants without pods plants without pods pea straw	0.61 0.58 0.50 0.54 1.3	20051123/E2-FPPS
Germany, 2006 (Santana)	EC	0.024	0.008	290	2	0 3 7 10	plants without pods	2.3 2.0 2.5 2.4	20061189/E1-FPPD
Germany, 2006 (Santana)	EC	0.024	0.008	290	2	14	pea straw	4.1	20061189/E1-FPPD

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.003 mg/kg for peas). Residues detected but below LOQ (0.01 mg/kg), are listed as < 0.01 mg/kg.

Table 41 Cypermethrin residues in bean fodder and forage resulting from supervised trials with cypermethrin in France, Germany, Italy, Spain and the UK

BEAN FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2006 (Contender)	EC	0.046	0.019	270, 240	2	0 1 3	plants without pods	1.7 1.5 0.98	20061189/E1-FPGB
France, 2006 (Contender)	ME	0.048	0.020	250, 240	2	0 1 3	plants without pods	1.5 1.3 1.0	20061189/E1-FPGB
France, 2007 (Yukon)	EC	0.026	0.012	210	2	7	plants without pods	0.52	20074060/E2-FPGB
Germany, 2007 (Classic)	EC	0.028	0.013	220	2	7	plants without pods	0.44	20074060/E2-FPGB
Greece, 2007 (Maestro)	EC	0.050	0.01	500	2	3	plants, without pods	0.71	20074060/E1-FPGB
Italy, 2006 (Avalon)	EC	0.049	0.012	400	2	0 1 3	plants without pods	1.8 1.7 1.7	20061189/E1-FPGB
Spain, 2006 (Cleo)	EC	0.048	0.016	300	2	3	plants without pods	1.5	20061189/E1-FPGB
Spain, 2006 (Prime1)	EC	0.051	0.016	320	2	3	plants without pods	1.5	20061189/E1-FPGB
Spain, 2007 (Sabinal)	EC	0.051 0.046	0.01	530 480	2	3	plants, without pods	0.49	20074060/E1-FPGB
Spain, 2007 (Troncon)	EC	0.051	0.01	500	2	0 1 3	plants, without pods	2.1 0.80 1.3	20074060/E1-FPGB
UK, 2007 (Paulista)	EC	0.025	0.013	200	2	0 3 6	plants without pods	1.3 1.5 0.53	20074060/E2-FPGB

Table 42 Cypermethrin residues in barley fodder and forage resulting from supervised trials with cypermethrin in France, Greece, Hungary, Poland, Spain and the UK

BARLEY FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2007 (Nickel)	EC	0.029	0.008	370	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.51 0.25 0.36 0.46 0.37	20074062/E1-FPBA
France, 2007 (Platine)	EC	0.032	0.010	310	1	28	barley straw	0.62	20074062/E1-FPBA
France, 2007 (Prestige)	EC[a]	0.042	0.010	410	1	28	barley straw	0.93	20074062/E2-FPBA
France, 2007 (Prestige)	EC[a]	0.042	0.021	200	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.61 0.26 0.38 0.42 1.0	20074062/E2-FPBA
Greece, 2007 (Arta)	EC[a]	0.041	0.014	300	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.86 1.7 1.4 1.0 1.2	20074062/E2-FPBA
Greece, 2007 (Arta)	EC[a]	0.042	0.014	300	1	28	barley straw	0.86	20074062/E2-FPBA
Greece, 2007 (Kares)	EC[a]	0.043	0.014	310	1	28	barley straw	1.1	20074062/E2-FPBA
Hungary, 2007 (KH Tural)	EC	0.032	0.010	310	1	0 7 14	plant (except ears) plant (except ears) plant (except ears)	0.63 0.60 0.72	20074062/E1-FPBA
Hungary, 2007 (Nelly)	EC	0.029	0.010	280	1	28	barley straw	0.33	20074062/E1-FPBA
Poland, 2007 (Kroton)	EC	0.032	0.010	310	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.48 0.41 0.27 0.24 0.30	20074062/E1-FPBA

BARLEY FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Poland, 2007 (Lomerit)	EC	0.034	0.010	320	1	28	barley straw	0.33	20074062/E1-FPBA
Spain, 2007 (Beckam)	EC[a]	0.045	0.021	220	1	28	barley straw	0.70	20074062/E2-FPBA
Spain, 2007 (Scarlen)	EC[a]	0.044	0.020	220	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.73 0.43 0.87 0.50 0.64	20074062/E2-FPBA
Spain, 2007 (unnamed)	EC[a]	0.044	0.020	220	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	1.7 1.9 1.6 1.0 0.76	20074062/E2-FPBA
UK, 2007 (Optic)	EC	0.031	0.015	200	1	28	barley straw	0.40	20074062/E1-FPBA
UK, 2007 (Safron)	EC	0.032	0.016	200	1	0 7 14 21 29	plant (except ears) plant (except ears) plant (except ears) plant (except ears) barley straw	0.37 0.28 0.40 0.34 0.33	20074062/E1-FPBA

[a] Formulation contains chlorpyrifos + cypermethrin. Chlorpyrifos data are not included in this evaluation.

Table 43 Cypermethrin residues in maize fodder and forage resulting from supervised trials with cypermethrin in France, Germany, Spain and the UK

MAIZE FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
France, 2005 (Constantino)	EC	0.062 0.067	0.015	410 450	2	21	plants	0.25	20051123/E1-FPMA
France, 2005 (LR33y65 PR33y45 fitic)	EC	0.066 0.059	0.015	440 390	2	29	plants	0.10	20051123/E1-FPMA
France, 2006 (Magistral)	EC	0.059	0.029	200	2	42	whole plant	0.03	20061189/E1-FPMA
Germany, 2006 (Birko)	EC	0.065	0.020	300, 320	2	45	whole plant	0.08	20061189/E1-FPMA
Germany, 2007 (Oldham)	EC	0.072	0.024	300	2	49	maize silage	< 0.02	20074060/E1-FPMA

MAIZE FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Spain, 2005 (DKC-6575)	EC	0.062	0.015	410	2	33	plants	0.14	20051123/E1-FPMA
UK, 2007 (Crown)	EC	0.076 0.074	0.037 0.025	200 300	2	54	maize silage	< LOD	20074060/E1-FPMA
UK, 2007 (Lincon)	EC	0.078 0.076	0.038 0.025	210 310	2	60	maize silage	0.17	20074060/E1-FPMA

[a] Residues reported as undetected are listed as < LOD (limit of detection, 0.006 mg/kg for plants or maize silage). Residues detected but below LOQ (0.02 mg/kg), are listed as < 0.02 mg/kg.

Table 44 Cypermethrin residues in wheat fodder and forage resulting from supervised trials with cypermethrin in France, Germany, Greece, Hungary, Poland, Spain and the UK

WHEAT FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
France, 2007 (Joyaux)	EC[a]	0.042	0.020	200	1	28	wheat straw	0.44	20074062/E2-FPWH
France, 2007 (Quality)	EC[a]	0.034	0.017	200	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.83 0.51 0.39 0.69 0.60	20074062/E2-FPWH
Germany, 2007 (Cubus)	EC[a]	0.032	0.010	310	1	28	wheat straw	0.48	20074062/E1-FPWH
Germany, 2007 (Turkis)	EC[a]	0.029	0.010	280	1	0 7 14 22 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.15 < 0.1 0.10 0.12 0.21	20074062/E1-FPWH
Greece, 2007 (Bronde)	EC[a]	0.043	0.014	310	1	27	wheat straw	0.45	20074062/E2-FPWH
Greece, 2007 (Estero)	EC[a]	0.042	0.014	300	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.44 0.63 0.51 0.60 1.0	20074062/E2-FPWH
Greece, 2007 (Mesapia)	EC[a]	0.043	0.014	310	1	27	wheat straw	0.25	20074062/E2-FPWH

WHEAT FODDER AND FORAGE	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin	
Hungary, 2007 (MV Ködmön)	EC[a]	0.033	0.010	320	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.39 0.46 <u>0.43</u> 0.29 <u>0.26</u>	20074062/E1-FPWH
Hungary, 2007 (MV Suba)	EC[a]	0.032	0.010	310	1	28	wheat straw	0.35	20074062/E1-FPWH
Poland, 2007 (Roma)	EC[a]	0.033	0.011	310	1	28	wheat straw	< 0.01	20074062/E1-FPWH
Poland, 2007 (Skawa)	EC[a]	0.031	0.010	300	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.72 0.69 0.85 <u>1.1</u> <u>0.57</u>	20074062/E1-FPWH
Spain, 2007 (Califa)	EC[a]	0.039	0.021	190	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.40 0.29 0.28 0.34 0.43	20074062/E2-FPWH
Spain, 2007 (Chamorro)	EC[a]	0.039	0.021	190	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.54 0.33 0.14 0.29 0.58	20074062/E2-FPWH
Spain, 2007 (Chamorro)	EC[a]	0.044	0.020	220	1	28	wheat straw	0.25	20074062/E2-FPWH
UK, 2007 (Access)	EC[a]	0.031	0.010	300	1	0 7 14 21 28	plant (except ears) plant (except ears) plant (except ears) plant (except ears) wheat straw	0.21 0.12 <u>0.36</u> 0.33 <u>0.25</u>	20074062/E1-FPWH
UK, 2007 (Einstein)	EC[a]	0.031	0.010	300	1	28	wheat straw	0.43	20074062/E1-FPWH

[a] Formulation contains chlorpyrifos + cypermethrin. Chlorpyrifos data are not included in this evaluation.

Table 45 Cypermethrin residues in sugar beet leaves or tops resulting from supervised trials with cypermethrin in Italy, Poland, Spain and the UK

SUGAR BEET LEAVES OR TOPS	Application					PHI	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		cypermethrin[a]	
Italy, 2005 (Opera)	EC	0.047	0.013	410	2	14	sugar beet leaves	0.01	20051123/E1-FPSB
Italy, 2006 (California)	EC	0.048	0.012	400	2	0 3 7 10 14	leaves + tops	1.3 0.32 0.30 0.14 0.14	20061189/E1-FPSB
Poland, 2007 (Soplica)	EC	0.049 0.054	0.025	210	2	0 3 7 10 14	sugar beet leaves	0.85 0.32 0.34 0.46 0.18	20074060/E1-FPSB
Poland, 2007 (Soplica)	EC	0.053	0.025	210	2	14	sugar beet leaves	0.32	20074060/E1-FPSB
Poland, 2007 (Soplica)	EC	0.053	0.025	210	2	14	sugar beet leaves	0.32	20074060/E1-FPSB
Spain, 2005 (Heracles)	EC	0.047	0.011	410	2	0 3 7 10 14	sugar beet leaves	0.82 0.59 0.30 0.30 0.25 c0.02	20051123/E1-FPSB
Spain, 2006 (Loanna)	EC	0.052	0.016	320	2	14	leaves + tops	0.31	20061189/E1-FPSB
UK, 2007 (Mars)	EC	0.050	0.025	200	2	14	sugar beet leaves	0.86	20074060/E1-FPSB
UK, 2007 (variety not stated)	EC	0.050	0.025	200	2	0 3 7 10 14	sugar beet leaves	1.0 0.69 0.86 0.89 0.01	20074060/E1-FPSB

Fate of Residues in Processing

In processing

The Meeting received information on the fate of cypermethrin residues during the processing of wheat.

Also information was provided on hydrolysis studies of cypermethrin to assist with identification of the nature of the residue during processing.

Pigeon (2007, 21048/4) treated 20 kg wheat grain with a cypermethrin UL formulation at 1.7 g ai/t and milled the wheat 1 and 7 days after treatment. No details are available on the milling process. Residue data for grain, bran and flour are summarised in Table 46.

Calculated processing factors:

wheat grain → bran: 2.6, 2.4

wheat grain → flour: 0.43, 0.27

Table 46 Cypermethrin residues in wheat and processed commodities resulting from supervised post-harvest treatment trials with cypermethrin in Belgium

WHEAT	Application			Conditions	Interval	Commodity	Residue, mg/kg	Ref
country, year (variety)	Form	g ai/t	no.		days after treatment		cypermethrin[a]	
Belgium, 2005 (Apache)	UL[b]	1.7	1	20 kg wheat treated moisture 15.1%	1 1 1 7 7 7	wheat grain bran flour wheat grain bran flour	1.17 3.0 c0.034 0.46 c0.034 1.40 3.30 c0.034 0.38 c0.032	21048/4

[a] c sample from control (untreated) grain.

[b] UL formulation of cypermethrin 20 g/L and piperonyl butoxide 57 g/L. Piperonyl butoxide residue data also reported, but not included in this evaluation.

Adam (2008, B37124) tested the stability of cypermethrin under hydrolysis conditions simulating pasteurisation and baking, brewing and boiling. Cypermethrin was stable to hydrolysis at the chosen conditions (Table 47).

Table 47 Hydrolysis of [^{14}C-benzyl ring]cypermethrin under conditions representing food processes (Adam, 2008, B37124). A cypermethrin of cis:trans composition 40:60 was prepared from radiolabelled pure cis and pure trans isomers

Concentration	Hydrolysis conditions			Represent	% cypermethrin remaining
0.005 mg/L	pH 4	90 °C	20 mins	pasteurisation	100% cis 101% trans
0.005 mg/L	pH 5	100 °C	60 mins	baking, brewing and boiling	99% cis 92% trans

RESIDUES IN ANIMAL COMMODITIES

The Meeting received information on residues in meat and milk resulting from a feeding experiment with lactating dairy cows.

Farm animal feeding studies

Lactating dairy cows

Groups of three lactating Friesian-Holstein dairy cows (animals weighing 460–685 kg on the day prior to the first dose) were dosed orally once daily via gelatin capsule with cypermethrin (cis:trans 40:60 technical) at 0.028 mg/kg bw (1×), 0.085 mg/kg bw (3×) and 0.284 mg/kg bw (10×), for 28 consecutive days (Heal, 2003, CYP/R78). Milk was collected throughout for analysis. Approximately 23–24.5 h after the final dose, the animals were slaughtered for tissue collection. Tissues collected for analysis were liver, kidney, fat (pooled from subcutaneous, mesenteric and renal fat) and muscle (pooled from equal amounts of loin, hindquarter and diaphragm muscle). Animals consumed 2.5 kg per animal per day of concentrate diets. Hay was fed *ad libitum* and intakes were not measured. Animals produced 15.3–19.5 kg milk per animal per day (averages within groups).

Cypermethrin residues were below LOQ (0.05 mg/kg) in muscle, kidney and liver at all dose levels. Cypermethrin residues were also below LOQ (0.005 mg/kg milk, 0.05 mg/kg tissue fat) in milk and tissue fat at the low dose. Residue levels in tissue fat and milk and the cis-trans composition of the residue are summarised in Table 48. No information was available on the distribution of the residue between the fat and non-fat milk fractions.

Residue levels reached a plateau within 3 days of the first dose and the composition of the cypermethrin (cis-trans ratio) also very soon reached a ratio of approximately 52:48 from the original 40:60.

Table 48 Cypermethrin residues in milk and tissues of lactating Friesian-Holstein dairy cows (three per group), dosed once daily via gelatin capsule with cypermethrin (cis:trans 40:60) at 0.028 mg/kg bw (1×), 0.085 mg/kg bw (3×) and 0.284 mg/kg bw (10×), for 28 consecutive days (Heal, 2003, CYP/R78).

Tissue, matrix	Cypermethrin, mg/kg		
	Dose 1× 0.028 mg/kg bw	Dose 3× 0.085 mg/kg bw	Dose 10× 0.284 mg/kg bw
Muscle	< 0.05	< 0.05	< 0.05
Kidney	< 0.05	< 0.05	< 0.05
liver	< 0.05	< 0.05	< 0.05
Fat (individual animals)	< 0.05	0.095 (cis:trans 52:48) 0.078 (cis:trans 47:53) 0.055 (cis:trans 53:47)	0.32 (cis:trans 49:51) 0.20 (cis:trans 47:53) 0.20 (cis:trans 48:52)
Milk day 3 [a]	< 0.005	0.013 (cis:trans 52:48)	0.029 (cis:trans 52:48)
Milk day 6 [a]	< 0.005	0.009 (cis:trans 52:48)	0.030 (cis:trans 52:48)
Milk day 9 [a]	< 0.005	0.009 (cis:trans 52:48)	0.034 (cis:trans 52:48)
Milk day 12 [a]	< 0.005	0.010 (cis:trans 52:48)	0.029 (cis:trans 52:48)
Milk day 15 [a]	< 0.005	0.009 (cis:trans 53:47)	0.033 (cis:trans 52:48)
Milk day 18 [a]	< 0.005	0.009 (cis:trans 53:47)	0.034 (cis:trans 52:48)
Milk day 21 [a]	< 0.005	0.007 (cis:trans 52:48)	0.037 (cis:trans 51:49)
Milk day 24 [a]	< 0.005	0.008 (cis:trans 52:48)	0.038 (cis:trans 50:50)
Milk day 27 [a]	< 0.005	0.008 (cis:trans 53:47)	0.036 (cis:trans 51:49)

[a] Cypermethrin residues in milk, average for group, PM milking.

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

Pongsapitch (2008) provided information from Thailand on unit weights and % edible portion to facilitate IESTI calculations for durian, mangosteen, longan and litchi. Unit weights are the unit weights of the median size of each fruit established in the National Bureau of Agricultural Commodity and Food Standards (ACFS). Percentage edible portion was compiled from a project on the establishment of a national food consumption database by ACFS.

Commodity	Unit weight, g	% Edible portion
Durian	3000	31%
Mangosteen	85	32%
Longan	10	67%
Litchi	33	63%

APPRAISAL

Cypermethrin was first evaluated by the 1979 JMPR and a number of times subsequently. It was reviewed for toxicology by the 2006 JMPR within the periodic review programme of the CCPR; the review included alpha-cypermethrin and zeta-cypermethrin, which had not previously been considered by the JMPR. The periodic review for residues was scheduled for 2008.

CCPR, at its 39th Session in 2007, noted that three manufacturers would submit residue data to JMPR on cypermethrins (including alpha and zeta cypermethrin) for consideration by the 2008 JMPR. Information and data were also provided by Australia, Japan, Malaysia and Thailand.

Separate monographs have been prepared for each of the three compounds, but they are considered together in a single appraisal.

The Meeting agreed that metabolism studies, environmental fate studies, methods of analysis and freezer storage stability studies of the cypermethrins were mutually supportive and should be considered together.

Comparison of composition

	ermethrin		pha-cypermethrin		:ypermethrin	
	14		-		3	
1S, cis-S		14		-		22
	11		50		22	
1S, cis-R		11		50		3
	14		-		3	
1S, trans-S		14		-		22
	11		-		22	
1S, trans-R		11		-		3

Animal metabolism

The Meeting received studies on lactating dairy cows and laying hens for both alpha-cypermethrin and cypermethrin. Studies on rats were reviewed by JMPR during the toxicology evaluation in 2006; rat studies were made available again.

After oral dosing of livestock with cypermethrins, much of the residues are readily excreted. The main component of the residue in tissues, milk and eggs is parent compound. The residue is fat soluble.

When a lactating dairy cow was orally dosed with [^{14}C]alpha-cypermethrin at the equivalent of 19 ppm in the diet over 5 days, the TRR quickly approached a plateau in milk. When milk was separated, 93% of the residue was in the cream suggesting fat solubility. TRR levels in tissue fat were approximately 20 times as high as in the muscle, also suggesting fat solubility.

Similar results were obtained from lactating dairy cow studies with cypermethrin. Levels of ^{14}C in the tissues from cypermethrin labelled in the cyclopropyl ring or the benzyl ring were much the same, suggesting that the ester bond was still intact in the residue.

When laying hens were orally dosed with [^{14}C]alpha-cypermethrin over 14 days, much of the ^{14}C was quickly excreted in the faeces. The TRR in eggs approached a plateau by days 7–9. Parent alpha-cypermethrin was the major identified component in fat and eggs, and the distribution between tissue fat and muscle suggested fat solubility. Metabolites at low levels were produced by ester cleavage and hydroxylation of the phenoxy ring.

A study with cypermethrin dosing of laying hens produced similar results. Ester hydrolysis was the main initial metabolic pathway for cypermethrin. Parent cypermethrin was a significant part of the residue in fat and egg yolks. DCVA (3-(2,2-dichlorovinyl)2,2-dimethylcyclopropane carboxylic acid) was a major part of the residue in muscle and liver. A number of minor metabolites were identified, especially in liver, as resulting from ester cleavage and hydroxylation of the phenoxy group.

The metabolic pathways of the cypermethrins in rats, cattle and hens are qualitatively similar in the respect that the metabolic products result from ester hydrolysis and hydroxylation.

No specific information was provided on possible isomerisation during animal metabolism. However, in the abiotic hydrolysis experiments with alpha-cypermethrin, epimerization rates were more rapid than hydrolysis rates, which suggest that where hydrolysis occurs, epimerization is a possibility.

Plant metabolism

The Meeting received plant metabolism studies with cypermethrin on lettuce, sugar beet, maize, cotton and apples; alpha-cypermethrin on cabbages and wheat, and zeta-cypermethrin on maize.

When cypermethrins are applied to a crop, the highest residue occurs on parts of the plant exposed to direct application. Parent compound is the major identified residue with very little absorbed or translocated. Metabolites result from ester hydrolysis and hydroxylation processes. Exposed residues are subject to isomerisation, presumably by a photolytic process.

When [^{14}C]cypermethrin was applied to lettuce via syringe, cypermethrin was a major part of the residue in lettuce sampled 30 days later. In a second experiment with lettuce, the levels of TRR were much higher in the outer leaves than in the inner leaves.

In a later study, when [^{14}C]cypermethrin was sprayed on lettuce plants, which were harvested 18 and 21 days after the second application, the ^{14}C residue was mostly on the outer leaves and cypermethrin was the main residue component, suggesting that cypermethrin is not translocated.

In a cabbage study with [^{14}C]alpha-cypermethrin, the residue occurred mostly on the outer (exposed) leaves and alpha-cypermethrin was the major component. Very little of the alpha-cypermethrin moved elsewhere in the plant. The alpha-cypermethrin residue had undergone considerable cis-trans isomerisation, with the cis 2 component, originally constituting 100% of alpha-cypermethrin, falling to 44% and 54% of the cypermethrin residue in the old and new leaves respectively. The isomerisation was presumably a photochemical reaction.

In the wheat studies with alpha-cypermethrin, the highest residue of ^{14}C occurred in the chaff and straw, the part of the plant exposed to the application. Parent alpha-cypermethrin was a major component of the residue. Translocation to the grain was minor. Where alpha-cypermethrin was exposed to sunlight, it was subject to isomerisation. Identified metabolites, which were generally minor components of the residue, resulted from ester hydrolysis or hydroxylation of a benzene ring.

When [^{14}C]cypermethrin was foliar sprayed three times on sugar beet, parent cypermethrin was the main component of the residue in roots (TRR 0.48 and 0.68 mg/kg) and leaves (TRR 7.0 and 9.1 mg/kg) when the crop was harvested 3 weeks after the final application. Metabolite DCVA and its conjugates (glucoside, malonyl glucoside and glucoside disulfate) constituted 35% of the TRR in both foliage and roots.

When [^{14}C]cypermethrin was painted on leaves of maize plants, very little of the ^{14}C reached the ears or grain. Parent cypermethrin was the major component of the residue in parts of the plant that were directly treated constituting 64–82% of the TRR in forage, silage, fodder and husk + stalk. DCVA and 3-phenoxybenzoic acid (and related degradation products) were identified in the residue as well as 4'-hydroxy-cypermethrin and cyperamide (-CN converted to $–CONH_2$).

The pattern of residues occurring in a maize metabolism study with foliar applied [^{14}C]zeta-cypermethrin was generally similar to that from the previous study with cypermethrin. A comparison of cis:trans ratios between the parent compound and the residue showed that the cis isomer was depleting more quickly. A parallel study with cypermethrin confirmed the similarity in residue behaviour between zeta-cypermethrin and cypermethrin. One difference was that the cis:trans ratio changed very little in the residue from cypermethrin labelled in the cyclopropyl ring.

When cotton was foliar sprayed with [^{14}C]cypermethrin and the crop harvested 74 and 88 days after treatment, parent cypermethrin was the major identified component of the residues, constituting 23–25% of TRR in the forage and 16% in the cotton seed. Numerous metabolites were identified that resulted from ester hydrolysis and hydroxylation.

In an experiment with apples where acetone solutions of [^{14}C]*cis*-cypermethrin and [^{14}C]*trans*-cypermethrin were applied to leaves or the surface of apples, residues remained mostly on the peel of apples harvested 22 days later. Part of the *cis*-cypermethrin had been converted to *trans*-cypermethrin (30% in leaf and 15% in apple peel), but not the reverse. Cypermethrin was the main component of the residue in apples. Metabolites resulting from ester hydrolysis were identified.

Environmental fate in soil

The Meeting received information on soil aerobic metabolism, soil photolysis and crop rotation.

The cypermethrins are generally not persistent in soils. Their residues in soils resulting from recommended uses should not contribute to the residues in root vegetables or to residues in succeeding crops. Identified soil metabolites result from ester hydrolysis. Cyperamide is produced in soil surface photolysis.

In laboratory soil metabolism studies, the half-lives were:

- alpha-cypermethrin at 20–25 °C: 20 days to 24 weeks (n = 3);
- cypermethrin at 20–25 °C: 6 days to 61 days (n = 10).

DCVA and 3-phenoxybenzoic acid were identified as soil metabolites.

In a series of soil metabolism studies at 25 °C with *cis*- and *trans*-cypermethrin, the percentage parent remaining after 52 weeks was 4.9–11% (n = 4) for *cis*-cypermethrin and 1.4–4.1% (n = 4) for *trans*-cypermethrin. 3-Phenoxybenzoic acid was identified as a metabolite.

The measured half-lives in soil surface hydrolysis studies were: alpha-cypermethrin 30 days; cypermethrin 470–690 hours (n = 4). DCVA, 3-phenoxybenzoic acid and cyperamide were identified as transformation products.

In a confined rotational crop study with wheat, cotton, lettuce and sugar beet, soil was treated with [^{14}C-benzyl ring]cypermethrin at the equivalent of 1 kg ai/ha and the crops were sown at 30, 60, 90 and 120 days later. Low levels of ^{14}C did enter all the crops, with concentrations lower as the time interval increased. The levels were too low for component identification. A parallel experiment with [^{14}C-cyclopropyl]cypermethrin and sugar beet produced similar results.

Metabolism in water-sediment systems

The Meeting received information on the fate of zeta-cypermethrin during aerobic aquatic metabolism.

Zeta-cypermethrin is not persistent in aerobic water-sediment systems with much of the residue being mineralized in a relatively short time.

The measured half-lives of parent zeta-cypermethrin in water-sediment systems at 20 and 25 °C were 8.8–12 days (n = 6). Identified metabolites were: 3-phenoxybenzoic acid, DCVA, DCVA dicarboxylic acid. Metabolites reached their maximum concentrations before the end of the experiments (duration 30 and 99 days), so were also metabolizing further. The degree of mineralization in 30 days was 47% and 11% and in 99 days was 16%, 21%, 52% and 57%.

Methods of analysis

The Meeting received descriptions and validation data for numerous analytical methods for residues of the cypermethrins in raw agricultural commodities, processed commodities, feed commodities, animal tissues, milk and eggs.

Residue analytical methods for the cypermethrins rely on GC-ECD, GC-MS or LC-MS-MS. Typically the residues can be measured in most matrices to an LOQ of 0.01 mg/kg (0.05 mg/kg in some older studies). Multiresidue method DFG S-19 is suitable for residue analysis of cypermethrin.

Stability of residues in stored analytical samples

Information was received on the freezer storage stability of:

- alpha-cypermethrin residues in apple, cattle fat, cattle kidney, cattle liver, cattle milk, cattle muscle, lettuce, oilseed rape plant, oilseed rape pod, oilseed rape seeds, soya bean, tomato, wheat, wheat grain, wheat green plant and wheat straw.
- cypermethrin residues in apples, cabbage, cotton seed, egg, green peas, lettuce, lettuce, poultry liver, poultry muscle, rape seed, soya beans, tomatoes and wheat grain.
- zeta-cypermethrin residues in dry pea grain, molasses, sugar beet dried pulp, sugar beet roots, wheat grain and white sugar.

Residues were apparently stable at freezer temperature for the intervals tested except for a few studies where no conclusion could be reached because of experimental problems. In an oilseed rape plant, pods and seeds study with alpha-cypermethrin, no samples were analysed until 4.5–5 months after fortification when residues were 40–50% of the nominal fortification level.

In an alpha-cypermethrin study on apples, residues were apparently stable for 52 weeks (110%) but had declined to 65% by week 84.

The results of a cypermethrin study on eggs were inconclusive because of low analytical method recoveries.

Residue definition

The parent compound (whether cypermethrin, alpha-cypermethrin or zeta-cypermethrin) is the dominant component of the residue in crop commodities and in tissues, milk and eggs from oral dosing of livestock. In animal metabolism, it displays the properties of a fat-soluble compound.

Some isomerisation and differential decay rates for different isomers occur for exposed residues in the field, so the composition of the residue is not necessarily identical with that of the applied compound.

The current residue definition, cypermethrin (sum of isomers), is a suitable analyte for enforcement purposes.

The Meeting decided that the residue would continue to be defined as fat-soluble.

The Meeting recommended a residue definition for the cypermethrins.

For plants and animals. Definition of the residue (for compliance with the MRL and for estimation of dietary intake)*: cypermethrin (sum of isomers).*

The residue is fat soluble.

USE PATTERN

The Meeting received information on the use patterns and labels for alpha-cypermethrin, cypermethrin and zeta-cypermethrin from many countries.

Results of supervised residue trials on crops

The Meeting received supervised trials data for alpha-cypermethrin, cypermethrin and zeta-cypermethrin.

Alpha-cypermethrin: citrus, apples, pears, cherries, peaches, grapes, strawberries, olives, leek, onion, broccoli, Brussels sprouts, cabbage head, cauliflower, cucumber, melon, egg plant, sweet peppers, sweet corn, tomato, kale, leafy cabbage, lambs lettuce, lettuce, spinach, peas, beans, soya beans, potato, sugar beet, turnip, asparagus, artichoke, barley, maize, oats, rice, sorghum, wheat, almond, cotton, linseed, rapeseed, cocoa, parsley, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, maize fodder and forage, oats fodder and forage, rice fodder and

forage, wheat fodder and forage, sugar beet leaves or tops, cotton fodder, rape seed fodder, hops and tea.

Cypermethrin: grapes, carambola, olives, durian, litchi, longan, mango, papaya, leek, onion, broccoli, Brussels sprouts, cabbage head, cauliflower, melon, okra, peppers Chilli, tomato, lettuce, spinach, peas, beans, carrot, potato, sugar beet, artichoke, asparagus, barley, maize, wheat, wheat, cotton seed, rapeseed, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, maize fodder and forage, wheat fodder and forage and sugar beet leaves or tops.

Zeta-cypermethrin: pome fruits, stone fruits, onion, broccoli, cucurbits, peppers, tomatoes, sweet corn, endive, lettuce, lettuce, spinach, mustard greens, peas, field beans, soya bean seed, sugar beet, sugar beet, maize, barley, wheat, oats and triticale, rice, sugar cane, peanuts, oilseed rape, cotton seed, coffee, alfalfa, pea fodder and forage, bean fodder and forage, barley fodder and forage, sweet corn fodder and forage, maize fodder and forage, oats and triticale straw, wheat fodder and forage, rice straw and sugar beet tops.

Where multiple sets of sufficient residue data were available on a commodity for more than one compound or with different uses (e.g., field and glasshouse), the set of data first chosen to support an MRL for that commodity was the one producing the highest estimated maximum residue level.

Where multiple sets of sufficient residue data were available for commodities in a Codex Commodity Food Group and where the Meeting decided to recommend a Commodity Group MRL, the set of data first chosen to support the MRL for that commodity group was the one producing the highest estimated maximum residue level.

The cypermethrins are used at quite low application rates, often around the 10–50 g ai/ha. For some commodities, residue levels arising from such low application rates may not produce detectable residues even on the day of application. For example, the median residue produced on the day of treatment by a 10 g ai/ha application would be expected to be at 0.01 mg/kg or lower for apples, Brussels sprouts, cucumber, melons, oranges, peppers, plums, summer squash and tomatoes.

Questions would usually be raised about the validity of a supervised trial where residues were not detected on the day of application to an exposed commodity, but allowance must be made for the low application rate.

No residue data were received for mushrooms. The Meeting withdrew the previous recommendation of 0.05* mg/kg for mushrooms.

Citrus fruits

No suitable GAP was available to evaluate the alpha-cypermethrin trials on citrus. The Meeting withdrew the previous recommendation of 2 mg/kg for citrus fruits.

Pome fruits

Polish GAP allows the use of alpha-cypermethrin on apple trees at 0.018 kg ai/ha with a PHI of 7 days. In two French trials matching Polish GAP (± 30% application rate), alpha-cypermethrin residues on apples were 0.01 and 0.05 mg/kg. In 6 German trials on apples matching Polish GAP (± 30% application rate), alpha-cypermethrin residues were: 0.05, 0.05, 0.05, 0.07, 0.08 and 0.17 mg/kg.

No suitable GAP was available to evaluate the remaining alpha-cypermethrin apple trials or the pear trials.

US GAP for pome fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI. In 23 US trials matching GAP, zeta-cypermethrin residues on apples were: 0.11, 0.11, 0.11, 0.12, 0.12, 0.13, 0.13, 0.13, 0.13, 0.13, 0.14, 0.15, 0.20, 0.21, 0.21, 0.22, 0.23, 0.24, 0.25, 0.25, 0.28 and 0.31 mg/kg.

US GAP for pome fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI. In 12 US trials matching GAP, zeta-cypermethrin residues on pears were: 0.05, 0.05, 0.06, 0.07, 0.24, 0.29, 0.31, 0.33, 0.39, 0.43, 0.49and 0.56 mg/kg.

The Meeting decided to use the combined apple and pear zeta-cypermethrin data, 34 trials, for a pome fruit recommendation, rank order, median underlined: 0.05, 0.05, 0.06, 0.07, 0.11, 0.11, 0.11, 0.12, 0.12, 0.13, 0.13, 0.13, 0.13, 0.13, 0.14, 0.15, 0.20, 0.21, 0.21, 0.22, 0.23, 0.24, 0.24, 0.25, 0.25, 0.28, 0.29, 0.31, 0.31, 0.33, 0.39, 0.43, 0.49 and 0.56 mg/kg.

On the basis of the zeta-cypermethrin data, the Meeting estimated a maximum residue level of 0.7 mg/kg for pome fruits to replace the previous recommendation of 2 mg/kg. The Meeting estimated STMR and HR values of 0.205 and 0.56 mg/kg respectively for pome fruits.

Stone fruits

Romanian GAP allows the use of alpha-cypermethrin on cherry and peach trees at a spray concentration of 0.0015 kg ai/hL and a PHI of 7 days.

In three French trials on cherries matching Romanian GAP, alpha-cypermethrin residues on cherries were < 0.05, 0.06 and 0.11 mg/kg.

In one French trial on peaches matching Romanian GAP, alpha-cypermethrin residues on peaches were 0.02 mg/kg.

In South Africa, alpha-cypermethrin may be used on peaches with a spray concentration of 0.0005 kg ai/hL and an interval to harvest of 14 days. In two South African trials according to GAP conditions, residues in the peaches were < 0.05 and 0.06 mg/kg.

No suitable GAP was available to evaluate the remaining alpha-cypermethrin peach trials.

US GAP for stone fruit allows the use of zeta-cypermethrin at 0.056 kg ai/ha with a 14 days PHI.

In 12 US trials matching stone fruit GAP, zeta-cypermethrin residues on cherries were: 0.52, 0.52, 0.53, 0.57, 0.58, 0.58, 0.60, 0.64, 0.77, 0.80, 0.86 and 0.94 mg/kg. This data set was used for maximum residue level estimation.

In 18 US trials matching stone fruit GAP, zeta-cypermethrin residues on peaches were: 0.08, 0.09, 0.09, 0.09, 0.09, 0.09, 0.10, 0.10, 0.10, 0.10, 0.11, 0.13, 0.13, 0.14, 0.14, 0.14, 0.15 and 0.16 mg/kg.

In 12 US trials matching stone fruit GAP, zeta-cypermethrin residues on plums were: 0.06, 0.06, 0.06, 0.06, 0.07, 0.08, 0.15, 0.18, 0.18, 0.21, 0.21 and 0.27 mg/kg.

The Meeting noted that zeta-cypermethrin cherry data were probably a different population from the peach and plum data and should not be combined. The Meeting noted that the GAP was for 'stone fruit' and decided to recommend a stone fruits MRL based on the cherry data.

On the basis of the zeta-cypermethrin cherry data, the Meeting estimated a maximum residue level of 2 mg/kg for stone fruits to replace the previous recommendations for cherries, nectarines, peaches and plums. The Meeting estimated STMR and HR values of 0.59 and 0.94 mg/kg respectively for stone fruits.

Grapes

French GAP for grapes allows the use of alpha-cypermethrin at 0.015 kg ai/ha with a 14 days PHI.

In 39 French and German trials on grapes matching French GAP (± 30% application rate), alpha-cypermethrin residues on grapes were (rank order, median underlined): < 0.01 (6), 0.01 (8), 0.02 (6), 0.03 (4), 0.04, < 0.05(10), 0.05, 0.06, 0.06 and 0.07 mg/kg.

Greek and Portuguese GAPs for grapes allow the use of alpha-cypermethrin at 0.015 kg ai/ha with a 7 days PHI.

In 18 Greek, Italian and Spanish trials on grapes matching Greek and Portuguese GAP (± 30% application rate), alpha-cypermethrin residues on grapes were: < 0.01 (4), 0.01 (4), 0.03, 0.03, 0.04, 0.05, 0.05, < 0.05 (4) and 0.05 mg/kg.

In 18 French trials on grapes matching Greek and Portuguese GAP (± 30% application rate), alpha-cypermethrin residues on grapes were: < 0.01 (10), 0.01, 0.01, 0.03, 0.04, 0.06, 0.08, 0.08 and 0.09 mg/kg. This data set was used for maximum residue level estimation.

No suitable GAP was available for evaluating the cypermethrin trials on grapes.

On the basis of the 18 alpha-cypermethrin trials in France matching Greek and Portuguese GAP, the Meeting estimated a maximum residue level of 0.2 mg/kg for grapes. The Meeting estimated STMR and HR values of 0.01 and 0.09 mg/kg respectively for grapes.

Strawberries

Alpha-cypermethrin may be used in Greece and Italy on glasshouse strawberries at 0.050 kg ai/ha with a PHI of 3 days. No glasshouse trials on strawberries were available at an application rate of 0.050 kg ai/ha.

Alpha-cypermethrin may be used on strawberries in the field in France at an application rate of 0.011 kg ai/ha with harvest 3 days later.

In 16 strawberry trials in Belgium, France, Germany, Netherlands and the UK matching French GAP (± 30% application rate), alpha-cypermethrin residues (rank order, median underlined) were: 0.005, 0.006, < 0.01 (11), 0.02, 0.02, 0.03 mg/kg.

Greek GAP allows the use of alpha-cypermethrin on strawberries in the field at 0.030 kg ai/ha with harvest 3 days later.

In eight strawberry trials in Greece, Italy and Spain matching Greek GAP (± 30% application rate), alpha-cypermethrin residues (rank order, median underlined) were: < 0.01 (5), 0.02, 0.02 and 0.05 mg/kg. This data set was used for maximum residue level estimation.

The two data populations are quite similar. The Meeting agreed to use the eight trials from Greece, Italy and Spain as the basis for the residue estimations.

On the basis of the eight alpha-cypermethrin trials in Greece, Italy and Spain matching Greek GAP, the Meeting estimated a maximum residue level of 0.07 mg/kg for strawberries. The Meeting estimated STMR and HR values of 0.01 and 0.05 mg/kg respectively for strawberries.

Olives

In Greece, alpha-cypermethrin may be used on olive trees at 0.030 kg ai/ha with a 7-days PHI. No trials were available to support the Greek GAP.

In Algeria, alpha-cypermethrin is registered for use on olive trees at a spray concentration of 0.002 kg ai/hL with harvest 14 days later.

In eight trials on olives in Greece and Spain where alpha-cypermethrin was used according to Algerian GAP (± 30% spray concentration), alpha-cypermethrin residues were: < 0.05 mg/kg (8). Residues were present in some samples from the trials, so it is not an 'essentially zero residue' situation and the STMR and HR are estimated equivalent to the LOQ.

No relevant GAP was available to evaluate the cypermethrin trials on olives.

On the basis of the eight alpha-cypermethrin trials in Greece and Spain matching Algerian GAP, the Meeting estimated a maximum residue level of 0.05* mg/kg for olives. The Meeting estimated STMR and HR values of 0.05 and 0.05 mg/kg respectively for olives.

Carambola

Cypermethrin is registered for use on carambola in Malaysia at 0.023 kg ai/ha with a PHI of 3 days.

In five carambola trials from Malaysia with cypermethrin use matching GAP, residues were (rank order, median underlined): < 0.02, < 0.02, < 0.02, 0.03 and 0.09 mg/kg.

The Meeting recognized that carambola is a minor crop and that five trials were sufficient for estimating a maximum residue level.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in carambola of 0.2, 0.02 and 0.09 mg/kg respectively.

Durian

In Thailand, cypermethrin is registered for use on durians at a high-volume spray concentration of 0.0125 kg ai/hL with harvest 14 days later.

In six durian trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.04, 0.08, 0.10, 0.17, 0.38 and 0.47 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in durian of 1, 0.135 and 0.47 mg/kg respectively.

Litchi

In Thailand, cypermethrin is registered for use on litchis at a high-volume spray concentration of 0.0075 kg ai/hL with harvest 14 days later.

In six litchi trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.25, 0.41, 0.45, 0.54, 0.57 and 0.79 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in litchis of 2, 0.495 and 0.79 mg/kg respectively.

Longan

In Thailand, cypermethrin is registered for use on longans at a high-volume spray concentration of 0.0075 kg ai/hL with harvest 14 days later.

In six longan trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.25, 0.27, 0.28, 0.32, 0.36 and 0.47 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in longans of 1, 0.30 and 0.47 mg/kg respectively.

Mango

In Thailand, cypermethrin is registered for use on mangos at a high-volume spray concentration of 0.005 kg ai/hL with harvest 5 days later.

In six mango trials from Thailand with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.09, 0.10, 0.15, 0.23, 0.25 and 0.35 mg/kg. No information was available on residues in edible portion.

The cypermethrin data on mangos from Malaysia could not be evaluated because no suitable GAP was available.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in mango of 0.7, 0.19 and 0.35 mg/kg respectively.

Papaya

In Malaysia, cypermethrin is registered for use on papaya at an application rate of 0.0275 kg ai/ha with harvest 14 days later.

In six papaya trials from Malaysia with cypermethrin use matching GAP, residues were (rank order, median underlined): 0.08, 0.10, 0.12, 0.15, 0.15 and 0.23 mg/kg. No information was available on residues in edible portion.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in papaya of 0.5, 0.135 and 0.23 mg/kg respectively.

Leek

In Germany, alpha-cypermethrin is registered for use on leeks at an application rate of 0.009 kg ai/ha with harvest 14 days later.

In eight leek trials from Germany with alpha-cypermethrin use matching GAP, residues were (rank order, median underlined): < 0.01 (4), 0.01, 0.02, 0.02 and 0.03 mg/kg.

In Spain, alpha-cypermethrin is registered for use on leeks at an application rate of 0.03 kg ai/ha with harvest 2 days later.

In two leek trials from France, one from Italy and one from Spain with alpha-cypermethrin use approximately matching GAP, residues were: 0.02, 0.03, 0.06 and 0.11 mg/kg.

No suitable GAP was available for evaluating the cypermethrin trials on leeks in France, Germany and Poland.

The number of trials on leeks matching Spanish GAP was too few to make a recommendation.

On the basis of the eight alpha-cypermethrin trials in Germany matching GAP, the Meeting estimated a maximum residue level of 0.05 mg/kg for leeks. The Meeting estimated STMR and HR values of 0.01 and 0.03 mg/kg respectively for leeks.

Onion

In Germany, alpha-cypermethrin is registered for use on onions at an application rate of 0.013 kg ai/ha with harvest 14 days later.

In 16 onion trials with alpha-cypermethrin use matching German GAP from Germany (4), France (6), Netherlands (4) and the UK (2), residues were: < 0.01 mg/kg (16). This data set was used for maximum residue level estimation.

No suitable GAP for onions was available to evaluate the cypermethrin residue trials from France, Germany, Greece, Italy, Poland, Spain and UK.

In Brazil, zeta-cypermethrin may be applied to onions at a spray concentration of 0.0036 kg ai/hL with a 5 days PHI.

In one trial in Brazil at GAP and a second trial at double application rate, zeta-cypermethrin residues in onion bulbs were < 0.05 mg/kg (2).

In USA, zeta-cypermethrin is registered for use on onions at an application rate of 0.056 kg ai/ha with harvest 7 days later.

In two US trials with zeta-cypermethrin on onions matching GAP, residues in onion bulbs were < 0.01 mg/kg (2).

Residues in the green onions were 0.19 and 0.57 mg/kg.

On the basis of the alpha-cypermethrin trials in Europe matching German GAP, the Meeting estimated a maximum residue level of 0.01* mg/kg for bulb onions. The Meeting estimated STMR and HR values of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in bulb onions.

The data on green onions (2 trials) were insufficient to estimate a maximum residue level.

Broccoli

In Denmark, alpha-cypermethrin is registered for use on broccoli at an application rate of 0.015 kg ai/ha with harvest 7 days later.

In 16 broccoli trials with alpha-cypermethrin use matching Danish GAP from Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (4), residues were (rank order, median underlined): < 0.01 (3), 0.01 (4), <u>0.02</u> (7), 0.03 and 0.03 mg/kg.

In Greece, alpha-cypermethrin is registered for use on broccoli at an application rate of 0.03 kg ai/ha with harvest 7 days later.

In four broccoli trials with alpha-cypermethrin use matching Greek GAP from Greece (1), France (1), Italy (1) and Spain (1), residues were: 0.01, 0.01, 0.02 and 0.03 mg/kg.

In Spain, cypermethrin is registered for use on broccoli at a spray concentration of 0.01 kg ai/hL with harvest 7 days later.

In one trial in France matching Spanish GAP for cypermethrin use, residues were 0.04 mg/kg.

In USA, zeta-cypermethrin is registered for use on broccoli at an application rate of 0.056 kg ai/ha with harvest 1 day later.

In two US trials with zeta-cypermethrin use on broccoli matching GAP, residues were < 0.05 and 0.57 mg/kg.

Brussels sprouts

In UK, alpha-cypermethrin is registered for use on Brussels sprouts at an application rate of 0.01 kg ai/ha with harvest 7 days later.

In 16 trials with alpha-cypermethrin use matching the UK GAP (± 30% application rate) from UK (4), Belgium (2), France (4), Germany (4) and Netherlands (2), residues were (rank order, median underlined): < 0.01 (6), <u>0.01</u> (4), 0.02 (4), 0.03 and 0.05 mg/kg.

In Greece, alpha-cypermethrin is registered for use on Brussels sprouts at an application rate of 0.03 kg ai/ha with harvest 7 days later.

In four Brussels sprouts trials with alpha-cypermethrin use matching Greek GAP from Greece (1), France (1), Italy (1) and Spain (1), residues were: < 0.01, < 0.01, 0.01 and 0.02 mg/kg.

In UK, cypermethrin is registered for use on Brussels sprouts at an application rate of 0.025 kg ai/ha with no PHI specified.

In nine trials with cypermethrin use on Brussels sprouts matching GAP of the UK (accepting highest residue from 0–7 days after application) from UK (3), Germany (5) and Poland (1), residues were (rank order, median underlined): < 0.01 (4), <u>0.01</u>, and 0.02 (4) mg/kg.

Cabbage, head

In UK, alpha-cypermethrin is registered for use on cabbages at an application rate of 0.01 kg ai/ha and a PHI of 7 days.

In 53 trials with alpha-cypermethrin use on cabbage matching the UK GAP (± 30% application rate) from the UK (21), Belgium (2), France (10) and Germany (20), residues were (rank order, median underlined): < 0.01 (17), 0.01 (4), <u>0.02</u> (6), 0.03, < 0.05 (13), 0.05 (4), 0.06, 0.07, 0.10 (3) , 0.11, 0.12 and 0.65 mg/kg. This data set was used for maximum residue level estimation.

In Denmark, alpha-cypermethrin is registered for use on cabbages at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In nine trials with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4) and UK (3), residues were: 0.03 and < 0.05 (8) mg/kg.

In the UK, cypermethrin is registered for use on cabbages at an application rate of 0.025 kg ai/ha with no PHI specified.

In nine trials with cypermethrin use on cabbage matching the UK GAP (accepting highest residue from 0–7 days after application) from UK (2), France (2) and Germany (5), residues were (rank order, median underlined): < 0.01 (7), 0.05 and 0.19 mg/kg.

Cauliflower

In UK, alpha-cypermethrin is registered for use on cauliflower at an application rate of 0.01 kg ai/ha and with a PHI of 7 days.

In 41 trials with alpha-cypermethrin use on cauliflower matching the UK GAP (± 30% application rate) from the UK (17), Denmark (2), France (5), Germany (13) and Netherlands (4), residues were (rank order, median underlined): < 0.01 (24), 0.01 (5), 0.02, < 0.05 (9), 0.05 and 0.09 mg/kg.

In Italy, alpha-cypermethrin is registered for use on cauliflower at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In eight trials with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (3), France (3), Greece (1) and Spain (1), residues were: < 0.01 (7) and 0.01mg/kg.

In the UK, cypermethrin is registered for use on cauliflowers at an application rate of 0.025 kg ai/ha with no PHI specified.

In six trials with cypermethrin use on cauliflower matching the UK GAP (accepting highest residue from 0–7 days after application) from the UK (2), France (2) and Germany (5), residues were: < 0.01 (3), 0.02, 0.03 and 0.03 mg/kg.

Brassica vegetables – summary

The Meeting noted that broccoli, Brussels sprouts, cabbages and cauliflowers are the major commodities of the Brassica vegetables group and that the cabbage data produced the highest maximum residue level. Alpha-cypermethrin is registered for use on the crop group Brassica vegetables in Spain, demonstrating that residues could occur on any of the Brassica vegetables.

On the basis of the alpha-cypermethrin cabbage data from 53 trials in Europe matching the UK GAP, the Meeting estimated a maximum residue level of 1 mg/kg for Brassica vegetables confirming the previous recommendation of 1 mg/kg. The Meeting estimated STMR and HR values of 0.02 and 0.65 mg/kg respectively for cypermethrin residues in Brassica vegetables.

Cucumber

In Denmark, alpha-cypermethrin is registered for use on greenhouse cucumbers at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 17 trials on protected cucumbers with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France (4), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 mg/kg (17).

Italian GAP allows alpha-cypermethrin use on greenhouse cucumbers at 0.05 kg ai/ha with harvest 7 days later.

In eight trials on protected cucumbers with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), Denmark (1), France (2), Germany (1), Greece (1) and Spain (1), residues were: < 0.01 (4) and 0.01 mg/kg (4).

The Meeting combined the data from the Danish GAP and Italian GAP as essentially of one population: < 0.01 (11) and 0.01 mg/kg (3).

Zeta-cypermethrin is registered for use on cucumbers in the USA with an application rate of 0.056 kg ai/ha and a PHI of 1 day.

In six US trials with zeta-cypermethrin use on cucumbers matching GAP, residues were: < 0.05 mg/kg (6).

Melon

Alpha-cypermethrin is registered for use on greenhouse melons in Greece with an application rate of 0.05 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on glasshouse melons matching Greek GAP (± 30% application rate) from Greece (1), Belgium (1), Denmark (1), France (2), Germany (1), Italy (1) and Spain (1), residues were: < 0.01 (5), 0.02, 0.03 and 0.05 mg/kg. This data set was used for maximum residue level estimation.

Alpha-cypermethrin is registered for use on field-grown melons in France with an application rate of 0.03 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on field-grown melons matching French GAP (± 30% application rate) from France (3), Greece (1) Italy (2) and Spain (2), residues were: < 0.01 (7) and 0.03 mg/kg.

In Spain, cypermethrin may be used on melons with a spray concentration of 0.01 kg ai/hL and with harvest 3 days later.

In nine trials with cypermethrin use on melons matching Spanish GAP from Spain (4), France (2) and Italy (3), residues were: < 0.01 (5), 0.01, 0.01, 0.02 and 0.02 mg/kg.

Zeta-cypermethrin is registered for use on cantaloupe in the USA with an application rate of 0.056 kg ai/ha and a PHI of 1 day.

In six US trials with zeta-cypermethrin use on cantaloupe matching GAP, residues were: < 0.02 and < 0.05 mg/kg (5).

In three alpha-cypermethrin trials and five cypermethrin trials, residues exceeded the LOQ in the fruit but residues in the pulp were all < LOD. However, it is not clear evidence of a nil residue.

Cucurbit fruiting vegetables – summary

The Meeting noted that cucumber and melons are two of the important commodities of the cucurbit vegetables group and that the melon data produced the highest maximum residue level. Alpha-cypermethrin is registered for use on the cucurbits crop group in Spain, demonstrating that residues could occur on any of the cucurbits.

On the basis of the alpha-cypermethrin trials on glasshouse melons in Europe matching Greek GAP, the Meeting estimated a maximum residue level of 0.07 mg/kg for cucurbit fruiting vegetables. On the basis of the whole melon data, the Meeting estimated STMR and HR values of 0.01 and 0.05 mg/kg respectively for cypermethrin residues in cucurbit fruiting vegetables.

Because melons have inedible peel, the Meeting estimated STMR and HR values for melons of 0.01 and 0.01 mg/kg respectively, based on the melon pulp data.

Eggplant

In France, alpha-cypermethrin may be used on egg plant at 0.012 kg ai/ha with harvest 7 days later. In a plastic tunnel trial and a glasshouse trial in France in line with French GAP, residues in egg plant were < 0.01 and 0.01 mg/kg.

The Meeting decided to use tomato data from a similar greenhouse use to support an eggplant maximum residue level.

In Denmark, alpha-cypermethrin is registered for use on greenhouse tomatoes at an application rate of 0.015 kg ai/ha and with a PHI of 7 days. In 18 trials on protected tomatoes with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France

(5), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 (14), 0.01, 0.01, 0.02 and 0.02 mg/kg.

On the basis of the alpha-cypermethrin trials on greenhouse tomatoes in Europe, the Meeting estimated a maximum residue level of 0.03 mg/kg for egg plant (extrapolation of tomato data to egg plant) to replace the previous recommendation of 0.2 mg/kg. The Meeting estimated STMR and HR values of 0.01 and 0.02 mg/kg respectively for cypermethrin residues in egg plant.

Sweet peppers

Alpha-cypermethrin is registered in Greece for use on greenhouse sweet peppers with an application rate of 0.05 kg ai/ha and a PHI of 7 days.

In six trials with alpha-cypermethrin use on greenhouse sweet peppers matching Greek GAP from Greece (1), Belgium (1), France (2), Italy (1) and Spain (1), residues were: 0.01, 0.02(3), 0.03 and 0.03 mg/kg.

Alpha-cypermethrin is registered in Greece for use on field-grown sweet peppers with an application rate of 0.03 kg ai/ha and a PHI of 7 days.

In eight trials with alpha-cypermethrin use on field-grown sweet peppers matching Greek GAP from Greece (2), France (2), Italy (2) and Spain (2), residues were: < 0.01 (4), 0.02 (3) and 0.03 mg/kg.

Zeta-cypermethrin is registered in the USA for use on peppers at 0.056 kg ai/ha with a 1-day PHI.

In six US trials with zeta-cypermethrin use on bell peppers matching GAP, residues were: < 0.02, < 0.02, < 0.05 (3) and 0.07 mg/kg. This data set was used for maximum residue level estimation.

On the basis of the zeta-cypermethrin trials on bell peppers in USA, the Meeting estimated a maximum residue level of 0.1 mg/kg for sweet peppers to replace the previous recommendation of 0.5 mg/kg for peppers. The Meeting estimated STMR and HR values of 0.05 and 0.07 mg/kg respectively for cypermethrin residues in sweet peppers.

Chilli peppers

In Thailand, cypermethrin is registered for use on Chilli peppers at a high-volume spray concentration of 0.025 kg ai/hL with harvest 7 days later.

In six Chilli pepper trials from Thailand with cypermethrin spray concentration 0.019 kg ai/hL (24% below GAP concentration, but within tolerance), residues 7 days after spraying were (rank order, median underlined): 0.24, 0.25, 0.45, 0.54, 0.62 and 0.69 mg/kg.

Zeta-cypermethrin is registered in the USA for use on peppers at 0.056 kg ai/ha with a 1-day PHI.

In three US trials with zeta-cypermethrin use on Chilli peppers matching GAP, residues were: < 0.02, < 0.05, and 0.19 mg/kg.

On the basis of the cypermethrin trials on Chilli peppers in Thailand, the Meeting estimated a maximum residue level of 2 mg/kg for Chilli peppers to replace the previous recommendation of 0.5 mg/kg for peppers. The Meeting estimated STMR and HR values of 0.495 and 0.69 mg/kg respectively for cypermethrin residues in Chilli peppers.

Okra

In Thailand, cypermethrin is registered for use on okra at a high-volume spray concentration of 0.011 kg ai/hL with harvest 5 days later.

In six okra trials from Thailand matching GAP conditions, residues 5 days after spraying were (rank order, median underlined): 0.01, 0.02, 0.05, 0.11, 0.18 and 0.20 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in okra of 0.5, 0.08 and 0.20 mg/kg respectively.

Sweet corn

No relevant GAP was available to evaluate the alpha-cypermethrin data on sweet corn.

Zeta-cypermethrin is registered in the USA for use on sweet corn at 0.056 kg ai/ha with a 3-days PHI.

No residues were detected (LOD = 0.01 mg/kg) in any sample in nine US trials with zeta-cypermethrin use on sweet corn matching GAP. Also, residues were not detected in a trial with application rate at 0.11 kg ai/ha. The LOQ in these trials was 0.05 mg/kg.

The Meeting estimated a maximum residue level of 0.05* mg/kg for sweet corn, which is the same as the previous recommendation. The Meeting estimated STMR and HR values of 0 and 0 mg/kg respectively for cypermethrin residues in sweet corn.

Tomato

In Denmark, alpha-cypermethrin is registered for use on greenhouse tomatoes at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 18 trials on protected tomatoes with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (3), France (5), Germany (2), Greece (2), Italy (2), Netherlands (2) and Spain (2), residues were: < 0.01 (14), 0.01, 0.01, 0.02 and 0.02 mg/kg.

In France, alpha-cypermethrin is registered for use on tomatoes at an application rate of 0.011 kg ai/ha and with a PHI of 3 days.

In 26 trials on field-grown tomatoes with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (12), Belgium (2), Germany (12), residues were: < 0.01 (23), 0.01, < 0.02 and < 0.02 mg/kg.

In Italy, alpha-cypermethrin is registered for use on field-grown tomatoes at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In 13 trials on field-grown tomatoes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (2), France (6), Greece (1), and Spain (4), residues were: < 0.01 (9), 0.01 (3) and 0.02 mg/kg.

In Italy, alpha-cypermethrin is registered for use on glasshouse tomatoes at an application rate of 0.05 kg ai/ha and with a PHI of 7 days.

In seven trials on protected tomatoes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), France (1), Germany (2), Greece (1), and Spain (1), residues were: < 0.01 (4), 0.01, 0.02 and 0.02 mg/kg.

Alpha-cypermethrin may be used on tomatoes in Brazil at 0.03 kg ai/ha with a 5-days PHI. In one trial matching GAP, residues were 0.03 mg/kg.

Alpha-cypermethrin may be used on tomatoes in South Africa at 0.01 kg ai/ha with a 4-days PHI. In two trials matching GAP, residues were both below LOQ (< 0.05 mg/kg).

No suitable GAP was available for evaluating the cypermethrin trials on tomatoes.

Zeta-cypermethrin may be used on tomatoes in Brazil at 0.02 kg ai/ha with a 5-days PHI.

In three zeta-cypermethrin trials on tomatoes in Brazil matching GAP conditions, residues 5 days after spraying were < 0.02, 0.02 an 0.04 mg/kg.

Zeta-cypermethrin may be used on tomatoes in USA at 0.056 kg ai/ha with a 1-day PHI.

In 12 zeta-cypermethrin trials on tomatoes in USA matching GAP conditions, residues 1 day after spraying were (rank order, median underlined): < 0.05 (6), 0.05, 0.06, 0.07, 0.08, 0.08 and 0.08 mg/kg. This data set was used for maximum residue level estimation.

On the basis of the zeta-cypermethrin trials on tomatoes in USA, the Meeting estimated a maximum residue level of 0.2 mg/kg for tomatoes to replace the previous recommendation of 0.5 mg/kg. The Meeting estimated STMR and HR values of 0.05 and 0.08 mg/kg respectively for cypermethrin residues in tomatoes.

Endive

Zeta-cypermethrin is registered for use on endives in Italy with a spray concentration of 0.0026 kg ai/hL and a PHI of 7 days.

In three zeta-cypermethrin trials on endives in Italy matching GAP conditions, residues were: 0.27, 0.36 and 0.38 mg/kg.

Lettuce

In Italy, alpha-cypermethrin is registered for use on glasshouse lettuce at an application rate of 0.05 kg ai/ha and with a PHI of 7 days.

In eight trials on protected lettuce with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), Belgium (1), Denmark (1), France (2), Germany (1), Greece (1), and Spain (1), residues were: 0.09, 0.21, 0.27, 0.30, 0.30, 0.57, 0.68 and 0.68 mg/kg.

In Italy, alpha-cypermethrin is registered for use on field-grown lettuce at an application rate of 0.03 kg ai/ha and with a PHI of 7 days.

In 12 trials on field-grown lettuce with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (4), France (2), Greece (2), and Spain (4), residues were: < 0.01, 0.04, 0.04, 0.06, 0.07 (3), 0.10, 0.11, 0.12, 0.13 and 0.52 mg/kg. This data set was used for maximum residue level estimation.

In Germany, alpha-cypermethrin is registered for use on lettuce at an application rate of 0.009 kg ai/ha and with a PHI of 3 days.

In 27 trials on lettuce with alpha-cypermethrin use matching German GAP (± 30% application rate) from Germany (17), Belgium (1), Denmark (2), France (2) and UK (5), residues were: 0.01, 0.01, 0.02, 0.02, 0.03, 0.04, < 0.05, 0.05, 0.05, 0.06, 0.06, 0.07, 0.07, 0.09, 0.10 (4), 0.11, 0.12, 0.15, 0.17, 0.17, 0.19, 0.21, 0.25 and 0.26 mg/kg.

Cypermethrin residue data on lettuce could not be evaluated because no relevant GAP was available.

Zeta-cypermethrin may be used on head lettuce in USA at 0.056 kg ai/ha with a 5-days PHI.

The US zeta-cypermethrin trials on head lettuce were sampled at days 3 and 7. From the 12 trials, the average decline rate of residues was calculated (half-life of residues = 7.2 days), equivalent to a 30% decline in residues in 3.7 days. Day 3 data are therefore an acceptable substitute for day 5 data (< 30% difference in 2 days interval).

In 12 zeta-cypermethrin trials on head lettuce in USA matching GAP conditions, except that day-3 data (or day-7, if higher) are used instead of day-5 data, residues were (rank order, median underlined): 0.16, 0.29, 0.34, 0.48, 0.75, 0.95, 1.4, 1.6, 1.9, 2.4, 2.5 and 2.8 mg/kg.

Zeta-cypermethrin is registered for use on lettuce in Italy with a spray concentration of 0.0026 kg ai/hL and a PHI of 7 days.

In three zeta-cypermethrin trials on lettuce in Italy matching GAP conditions, residues were: 0.18, 0.18 and 0.28 mg/kg.

Zeta-cypermethrin may be used on leaf lettuce in USA at 0.056 kg ai/ha with a 1-day PHI.

In eight zeta-cypermethrin trials on leaf lettuce in USA matching GAP conditions, residues were (rank order, median underlined): 1.5, 1.6, 2.3, 2.3, 2.4, 2.4, 2.7 and 3.3 mg/kg.

On the basis of the zeta-cypermethrin trials on head lettuce in USA, the Meeting estimated STMR and HR values of 1.18 and 2.8 mg/kg respectively for cypermethrin residues in head lettuce. However, the IESTI calculated from the HR (2.8 mg/kg) for head lettuce exceeded the ARfD and the Meeting examined data from an alternative GAP as suitable for establishing an MRL.

On the basis of the zeta-cypermethrin trials on leaf lettuce in USA, the Meeting estimated STMR and HR values of 2.35 and 3.3 mg/kg respectively for cypermethrin residues in leaf lettuce. However, the IESTI calculated from the HR (3.3 mg/kg) for leaf lettuce exceeded the ARfD and the Meeting examined data from an alternative GAP as suitable for establishing an MRL.

Kale

No suitable GAP was available for evaluating the alpha-cypermethrin trials on kale.

Leafy cabbage, lambs lettuce

In France, alpha-cypermethrin may be used on lettuce and similar at 0.011 kg ai/ha with harvest 7 days later. This GAP was accepted as including leafy cabbage. The same use pattern applies to lambs lettuce.

In four trials on leafy cabbage with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (2) and Netherlands (2), residues were: 0.15, 0.21, 0.22 and 0.35 mg/kg.

In two trials on lambs lettuce with alpha-cypermethrin use matching French GAP, residues were 0.28 and 0.29 mg/kg.

The numbers of trials were too few to support recommendations.

Spinach

No suitable GAP was available to evaluate the alpha-cypermethrin trials on spinach in France, Germany and Netherlands.

In Spain, cypermethrin is approved for use on spinach at a spray concentration of 0.01 kg ai/hL with harvest 7 days later.

In three trials on spinach with cypermethrin use matching Spanish GAP (± 30% application rate) from France (1) and Germany (2), residues were: 0.34, 0.45 and 0.50 mg/kg.

Zeta-cypermethrin may be used on spinach in USA at 0.056 kg ai/ha with a 1-day PHI.

In eight zeta-cypermethrin trials on spinach in USA matching GAP conditions, residues were (rank order, median underlined): 2.8, 3.1, 3.4, 3.4, 3.6, 4.5, 5.0 and 5.7 mg/kg.

On the basis of the zeta-cypermethrin trials on spinach in USA, the Meeting estimated STMR and HR values of 3.5 and 5.7 mg/kg respectively for cypermethrin residues in spinach.

However, the IESTI calculated from the HR (5.7 mg/kg) for spinach exceeded the ARfD and the Meeting examined data from an alternative GAP.

The three cypermethrin trials on spinach were insufficient on their own to estimate a maximum residue level

Mustard greens

No suitable GAP was available to evaluate the zeta-cypermethrin trials on mustard greens in USA.

Leafy vegetables group – summary

The Meeting noted that lettuce and spinach are major commodities of the leafy vegetables group and that the spinach data produced the highest estimated maximum residue level. However, some trials

data for lettuce and spinach at higher GAPs could not be used because the calculated IESTI values exceeded the ARfD. For lettuce, an assessment was possible on data from an alternative GAP. Alpha-cypermethrin is registered for use on 'vegetables' in Bulgaria, demonstrating that residues could occur on any of the leafy vegetables.

On the basis of the alpha-cypermethrin trials on protected lettuce in Europe matching Italian GAP, the Meeting estimated an HR value of 0.68 mg/kg for cypermethrin residues in leafy vegetables. However, the IESTI calculated with an HR of 0.68 mg/kg for spinach exceeded the ARfD, suggesting preference for an alternative GAP.

On the basis of the 12 alpha-cypermethrin trials on field-grown lettuce in Italy, France, Greece and Spain matching Italian GAP, the Meeting estimated a maximum residue level of 0.7 mg/kg for leafy vegetables to replace the previous recommendations for kale, lettuce and spinach. The Meeting estimated STMR and HR values of 0.07 and 0.52 mg/kg for cypermethrin residues in leafy vegetables.

Peas – legume vegetables

In Denmark, alpha-cypermethrin is registered for use on peas at an application rate of 0.015 kg ai/ha and with a PHI of 7 days.

In 16 trials on peas with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (4) residues in peas (seeds) were all below LOQ: < 0.01 (16).

No suitable GAP was available for evaluating the alpha-cypermethrin data on pea pods.

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL and a 7-days PHI.

In six trials on peas with cypermethrin use matching Spanish GAP (± 30% application rate) from France (4) Germany (2), residues in pea pods were: 0.02, 0.02, 0.03, 0.05, 0.06 and 0.13 mg/kg.

In Italy, cypermethrin is registered for use on peas with a spray concentration of 0.0075 kg ai/hL and a 14-days PHI.

In three trials on peas with cypermethrin use matching Italian GAP (± 30% application rate) from France (1) Germany (2), residues in peas (seeds) were all below LOQ: < 0.01 (2) and < 0.02 mg/kg. In 1 trial, residues in pea pods were measured at 0.09 mg/kg.

In France, zeta-cypermethrin is registered for use on peas at 0.018 kg ai/ha and with a 7-days PHI.

In 14 trials on peas with zeta-cypermethrin use matching French GAP (± 30% application rate) from France (7), Italy (3) and the UK (4), residues in shelled peas were all non-detects or below LOQ: < 0.01 mg/kg (14).

In 10 trials on peas with zeta-cypermethrin use matching French GAP (± 30% application rate) from France (7), Italy (1) and the UK (2), residues in pea pods were: < 0.01 (4), 0.02 (4), 0.03 and 0.03 mg/kg.

In the UK, zeta-cypermethrin is registered for use on peas at 0.015 kg ai/ha and with a 14-days PHI.

In two trials on peas with zeta-cypermethrin use matching the UK GAP (± 30% application rate) from France (2), residues in and shelled peas were below LOQ: and < 0.05 mg/kg (2).

In USA, zeta-cypermethrin is registered for use on peas at 0.056 kg ai/ha with a 1-day PHI for succulent peas.

In six zeta-cypermethrin trials on peas in USA matching GAP conditions, residues in succulent shelled peas were: < 0.03 (3), < 0.05, 0.05 and 0.06 mg/kg.

Beans – legume vegetables

In France, alpha-cypermethrin may be used on beans at 0.03 kg ai/ha with harvest 7 days later.

In 18 trials on beans with alpha-cypermethrin use matching French GAP (± 30% application rate) from France (13), Greece (1), Italy (2) and Spain (2), residues in bean pods were: < 0.01, 0.01, 0.02 (4), 0.03, < 0.05 (8), 0.07, 0.09 and 0.11 mg/kg.

In Denmark, alpha-cypermethrin may be used on beans at 0.015 kg ai/ha with harvest 7 days later.

In 18 trials on beans with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Belgium (2), France (6), Germany (2), Netherlands (4) and the UK (4), residues in bean pods were: < 0.01 (4), 0.01 (5), 0.02 (6), 0.03, 0.03 and 0.04 mg/kg.

In Spain, cypermethrin may be applied to beans with a spray concentration of 0.01 kg ai/hL with a 3-days PHI.

In eight trials on beans with cypermethrin use matching Spanish GAP (± 30% application rate) from Spain (2), France (1), Germany (2), Greece (1), Italy (1) and the UK (1), residues in bean pods were: 0.01, 0.02, 0.02, 0.02, 0.03, 0.03, 0.05 and 0.08 mg/kg.

Zeta-cypermethrin may be used on beans in the UK at 0.015 kg ai/ha with a 14-days PHI.

In 12 zeta-cypermethrin trials on beans in the UK matching GAP conditions, residues on the whole bean or bean pods were (rank order, median underlined): < 0.01 (3), 0.02, 0.02, <u>0.22</u>, <u>0.22</u>, 0.26, 0.30, 0.32, 0.41 and 0.45 mg/kg. This data set was used for maximum residue level estimation.

In USA, zeta-cypermethrin is registered for use on beans at 0.056 kg ai/ha with a 1-day PHI for succulent beans.

In six zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the whole pods were: < 0.05, 0.07, 0.09, 0.21, 0.29 and 0.30 mg/kg.

In six zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the succulent shelled beans were all non-detects: < 0.01 mg/kg (6).

Legume vegetables – summary

Because of sufficient data on peas and beans, the Meeting agreed that a legume vegetable group maximum residue level should be estimated. In Bulgaria, alpha-cypermethrin is registered for use on 'vegetables', which includes peas and beans with and without pods, suggesting that residues could occur on any of the legume vegetables.

On the basis of the zeta-cypermethrin trials on beans in the UK (residues on whole bean or bean pods), the Meeting estimated a maximum residue level of 0.7 mg/kg for legume vegetables. The Meeting estimated STMR and HR values of 0.22 and 0.45 mg/kg respectively for cypermethrin residues in legume vegetables.

Peas - pulses

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL and a 7-days PHI.

In six trials on peas with cypermethrin use matching Spanish GAP (± 30% application rate) from France (4) Germany (2), residues in peas (seeds) were all not detected or below LOQ: < 0.01 mg/kg (6).

In UK, zeta-cypermethrin is registered for use on peas at 0.015 kg ai/ha and with a 14-days PHI.

In three trials on peas with zeta-cypermethrin use matching the UK GAP (± 30% application rate) from UK, residues in and pea seeds were below LOQ: < 0.01 mg/kg (3).

In USA, zeta-cypermethrin is registered for use on peas at 0.056 kg ai/ha with a PHI for dried peas of 21 days.

In two zeta-cypermethrin trials on peas in USA matching GAP conditions, residues in dry shelled peas were: < 0.05 mg/kg (2).

Beans – pulses

See 'beans – legumes' for GAP on beans.

Numerous data (all below LOQ) were available on bean seeds with various application rates and intervals between application of alpha-cypermethrin and harvest. The following data for bean seed arise from trials where the application rate was 0.015 kg ai/ha (the GAP rate) or higher and the PHI was between 0 and 7 days:< 0.01(15), < 0.05 mg/kg (8). The 23 trials originate from France (7), Italy (1), Netherlands (2), Spain (2) and the UK (11).

In USA, zeta-cypermethrin is registered for use on beans at 0.056 kg ai/ha with a 21-days PHI for dried beans.

In seven zeta-cypermethrin trials on beans in USA matching GAP conditions, residues on the dried beans were: < 0.01 (5) and < 0.05 mg/kg (2).

Soya bean

No relevant GAP was available to evaluate the alpha-cypermethrin trials on soya bean in Brazil.

In Brazil, zeta-cypermethrin is registered for use on soya beans at 0.015 kg ai/ha with a 15-days PHI or at 0.05 kg ai/ha with a 30-days PHI.

In three zeta-cypermethrin trials in soya bean in Brazil with conditions in line with GAP, residues in soya beans were < 0.05 mg/kg (3).

In USA, zeta-cypermethrin is registered for use on soya beans at 0.056 kg ai/ha with a 21-days PHI.

In two zeta-cypermethrin trials in soya bean in USA with conditions in line with GAP, residues in soya beans were < 0.03 mg/kg (2). Thirteen other trials were reported where the interval between final treatment and harvest was 28-30 days (longer than the specified 21 days), In each case the residue was below the limit of detection (0.03 mg/kg).

The Meeting accepted the 30-days data in support of the GAP data.

Pulses - summary

The Meeting noted that dry peas, beans and soya beans are major commodities of the pulses group and that the soya bean data produced the highest estimated maximum residue level. Residues were not present in the pulses, but the soya bean data had been produced by an analytical method with the highest LOQ. Alpha-cypermethrin is registered for use on 'pulses' in Spain, suggesting that alpha-cypermethrin could be used on any pulse crop.

On the basis of the cypermethrin soya bean data, the Meeting estimated a maximum residue level of 0.05* mg/kg for pulses to replace the previous recommendation for soya bean (dry). The Meeting estimated an STMR value of 0.05 mg/kg for cypermethrin residues in pulses.

Potato

Alpha-cypermethrin is registered for use on potato crops in France with an application rate of 0.0125 kg ai/ha and a PHI of 21 days.

Because the residues in the tubers are below LOQ (0.01 mg/kg) we can accept data also from trials with higher application rates and shorter PHIs. There are 36 potato trials that meet these criteria. Residues in the tubers in the 36 trials were all below LOQ (0.01 mg/kg).

Cypermethrin is registered for use on potato crops in Poland with an application rate of 0.02 kg ai/ha and a PHI of 30 days. As before, we can accept trials with higher application rates and shorter PHIs. There are 12 potato trials with cypermethrin that meet the criteria. Residues in the tubers were all below LOQ (0.01 mg/kg).

The metabolism studies suggest non-translocation of cypermethrin, so it is not expected to migrate to the tubers. A number of the supervised trials on potatoes were at exaggerated rates, which suggests an "essentially zero" residue situation.

Carrot

Cypermethrin is registered for use on carrot crops in Spain with a spray concentration of 0.01 kg ai/hL and a PHI of 7 days.

In six trials on carrots with cypermethrin use matching Spanish GAP (± 30% application rate) from Germany (3) and UK (3), residues in carrots were all below the LOD (0.003 mg/kg). Note that the LOQ for the analytical method in these trials was 0.01 mg/kg. Residues were detected in carrots in trials with higher application rates.

Sugar beet

Alpha-cypermethrin is registered for use on sugar beet crops in Germany with an application rate of 0.01 kg ai/ha and no specified PHI.

In eight alpha-cypermethrin trials on sugar beet in Germany with conditions in line with GAP, the highest residues in sugar beet root on any day of the trial were: < 0.01 (3), < 0.02 (4) and 0.07 mg/kg. This data set was used for maximum residue level estimation.

Alpha-cypermethrin is registered for use on sugar beet crops in Greece with an application rate of 0.03 kg ai/ha and a 14-days PHI.

In seven alpha-cypermethrin trials on sugar beet in Greece (2), Italy (3) Spain (2), with conditions in line with Greek GAP, residues in sugar beet root were all below LOQ (0.01 mg/kg):

The cypermethrin trials on sugar beet could not be evaluated because no suitable GAP was available.

In USA, zeta-cypermethrin is registered for use on sugar beet at 0.056 kg ai/ha with a 21-days PHI.

In eight zeta-cypermethrin trials in sugar beet in USA with conditions in line with GAP, residues in sugar beet root on day 21 after the final application were all non-detects (< 0.02 mg/kg).

On the basis of the alpha-cypermethrin trials on sugar beet in Germany, the Meeting estimated a maximum residue level of 0.1 mg/kg for sugar beet. The Meeting estimated an STMR value of 0.01 mg/kg for cypermethrin residues in sugar beet.

Root and tuber vegetables - summary

The Meeting noted that potatoes, carrots and sugar beet are major commodities of the root and tuber vegetables group and that residues did not exceed LOQ except for sugar beet from one trial.

On the basis of the alpha-cypermethrin and cypermethrin data for potatoes and carrots, the Meeting estimated a maximum residue level of 0.01* mg/kg for root and tuber vegetables (except sugar beet) to replace the previous recommendation of 0.05* mg/kg. The Meeting estimated STMR and HR values of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in root and tuber vegetables (except sugar beet).

Asparagus

Alpha-cypermethrin is registered for use on asparagus crops in Germany with an application rate of 0.0125 kg ai/ha and no specified PHI.

In seven alpha-cypermethrin trials on asparagus in France with conditions in line with German GAP, the residues in asparagus stalks were all below LOQ: < 0.01 (3), and < 0.02 mg/kg (4).

In Thailand, cypermethrin is registered for use on asparagus at a high-volume spray concentration of 0.025 kg ai/hL with harvest 3 days later.

In two asparagus trials from Thailand matching GAP conditions, residues 3 days after spraying were: 0.06 and 0.18 mg/kg.

The two Thai trials were insufficient for estimating a maximum residue level.

On the basis of the alpha-cypermethrin trials on asparagus in France, the Meeting estimated a maximum residue level of 0.01* mg/kg for asparagus. The Meeting estimated an STMR value and an HR value of 0.01 and 0.01 mg/kg respectively for cypermethrin residues in asparagus.

Artichoke

In Italy, alpha-cypermethrin is registered for use on artichokes at 0.03 kg ai/ha with a PHI of 7 days.

In four trials on artichokes with alpha-cypermethrin use matching Italian GAP (± 30% application rate) from Italy (1), France (1), Greece (1) and Spain (1), residues in artichokes were: 0.02, 0.02, 0.03 and 0.04 mg/kg.

No suitable GAP was available to evaluate the cypermethrin trials on artichoke from France and Spain.

On the basis of the alpha-cypermethrin trials on artichokes matching Italian GAP, the Meeting estimated a maximum residue level of 0.1 mg/kg for artichoke. The Meeting estimated an STMR value and an HR value of 0.025 and 0.040 mg/kg respectively for cypermethrin residues in artichokes.

Barley

In Denmark, alpha-cypermethrin may be used on barley at 0.015 kg ai/ha with harvest 42 days later.

In 26 trials on barley with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Denmark (2), France (4), Germany (18) and the UK (2), residues in barley grain were (rank order, median underlined): < 0.01 (4), 0.01, 0.02 (4), 0.03 (4), 0.04 (4), 0.05, 0.05, 0.06, 0.06, 0.08, 0.09, 0.17, 0.17 and 0.22 mg/kg. This data set was used for maximum residue level estimation.

In Poland, cypermethrin may be used on cereals at 0.03 kg ai/ha and a PHI of 30 days.

In seven trials on barley with cypermethrin use matching Polish GAP (± 30% application rate) from Poland (2), France (2), Hungary (1) and the UK (2), residues in barley grain were (rank order, median underlined): 0.05, 0.05, 0.09, 0.10, 0.11, 0.12 and 0.19 mg/kg.

In Germany, zeta-cypermethrin may be used on barley at 0.015 kg ai/ha and a PHI of 35 days.

In 10 trials on barley with zeta-cypermethrin use matching German GAP (± 30% application rate) from Germany (4), France (3) and the UK (3), residues in barley grain were (rank order, median underlined): 0.01, < 0.02, 0.02, 0.02, 0.02, 0.03, 0.03, 0.04, 0.17 and 0.19 mg/kg.

Maize

In France, alpha-cypermethrin may be used on maize at 0.03 kg ai/ha with a PHI of 21 days.

Because the residues in maize grain were below LOQ irrespective of application rates or interval between treatment and harvest, trials with higher application rates or shorter PHIs are acceptable in supporting the residue evaluation for the selected GAP.

In six trials on maize with alpha-cypermethrin use in France matching French GAP or at higher rates or briefer PHIs, residues in maize grain were all below LOQ (0.01 mg/kg).

In Austria, cypermethrin may be used on maize at a spray concentration of 0.0075 kg ai/hL with a PHI of 49 days. In one cypermethrin trial in France at 0.015 kg ai/hL (2× Austrian GAP), residues in maize kernels harvested 29 days after treatment were not detected (LOD = 0.003 mg/kg). The other cypermethrin-maize trials could not be evaluated because no relevant GAP was available.

In USA, zeta-cypermethrin is registered for use on maize at 0.056 kg ai/ha with a PHI of 30 days to grain harvest.

In 25 zeta-cypermethrin trials on maize in USA with conditions in line with GAP, residues in maize grain were either below LOD (23 trials < 0.01 mg/kg) or below LOQ (2 trials < 0.05 mg/kg).

In Brazil, zeta-cypermethrin is registered for use on maize at 0.020 kg ai/ha with a PHI of 20 days.

In seven zeta-cypermethrin trials on maize in Brazil with application rates equal to or higher than required by Brazilian GAP, residues in maize grain were all below LOQ (0.05 mg/kg).

The other zeta-cypermethrin trials on maize could not be evaluated because no suitable GAP was available.

Oats

In Germany, alpha-cypermethrin may be used on cereals at 0.013 kg ai/ha with a PHI of 35 days.

In seven alpha-cypermethrin trials on oats in Germany with conditions in line with GAP, residues in oat grain on days 35-39 after the final application were: < 0.01, 0.01, < 0.02 (4) and 0.05 mg/kg.

No suitable GAP was available for evaluating the zeta-cypermethrin trials on oats and triticale.

Rice

No suitable GAP was available for evaluating the alpha-cypermethrin trials on rice.

In USA, zeta-cypermethrin is registered for use on rice at 0.056 kg ai/ha with a PHI of 14 days.

In 22 zeta-cypermethrin trials on rice in USA with conditions in line with US GAP, residues in rice grain (rank order, median underlined) were: 0.15, 0.39, 0.39, 0.40, 0.41, 0.42, 0.45, 0.49, 0.54, 0.56, <u>0.57</u>, <u>0.57</u>, 0.59, 0.59, 0.61, 0.63, 0.63, 0.73, 0.74, 0.75, 0.87 and 1.1 mg/kg. This data set was used for maximum residue level estimation.

Sorghum

No suitable GAP was available for evaluating the alpha-cypermethrin trials on sorghum.

Wheat

In Denmark, alpha-cypermethrin may be used on wheat at 0.015 kg ai/ha with harvest 42 days later.

In 39 trials on wheat with alpha-cypermethrin use matching Danish GAP (± 30% application rate) from Belgium (2), France (18), Germany (17) and the UK (2), residues in wheat grain were (rank order, median underlined): < 0<u>.01</u> (21), 0.01, 0.02, < 0.02 (3), < 0.05 (12) and 0.36 mg/kg. The 0.36 mg/kg appears out-of-context with all the other data on wheat grain; it also disagrees with residue levels in the grain at days 28 and 34 from the same trial (< 0.05 and < 0.05 mg/kg). The residue value was disregarded.

No suitable GAP was available for evaluating the other alpha-cypermethrin trials on wheat.

In France, cypermethrin is registered for use on cereals at 0.025 kg ai/ha with no specified PHI.

In eight trials on wheat with cypermethrin use matching French GAP (± 30% application rate) from Germany (2), Hungary (2), Poland (2) and the UK (2), residues in wheat grain were (rank order, median underlined): < 0.01 (5), 0.01, 0.02 and 0.02 mg/kg.

No GAP information was available to support evaluation of the 4 trials with post-harvest treatment of wheat with cypermethrin.

In Germany, zeta-cypermethrin is registered for use on wheat at 0.015 kg ai/ha with a 35-days PHI.

In 16 trials on wheat with zeta-cypermethrin use matching German GAP (± 30% application rate) from Germany (8), France (3), Italy (2), Spain (1) and the UK (2), residues in wheat grain were: < 0.01 (13), 0.01, 0.01 and 0.02 mg/kg.

In USA, zeta-cypermethrin is registered for use on wheat at 0.056 kg ai/ha with a 14-days PHI for grain, forage or hay harvest.

In two zeta-cypermethrin trials on wheat in USA with conditions in line with GAP, residues in wheat grain on days 14-15 after the final application were < 0.05 and 0.05 mg/kg.

Cereal grains – summary

Alpha-cypermethrin is registered for use on 'cereals' in Belgium, Bulgaria and Spain, suggesting that residues could occur on any of the cereal grains. The Meeting agreed to estimate a rice maximum residue level and a cereal grains (except rice) group maximum residue level.

On the basis of the alpha-cypermethrin trials on barley matching Danish GAP, the Meeting estimated a maximum residue level of 0.3 mg/kg for cereal grains (except rice) to replace the previous recommendations for barley, maize and wheat. The Meeting estimated an STMR value of 0.035 mg/kg for cypermethrin residues in cereal grains (except rice).

On the basis of the zeta-cypermethrin trials on rice in USA, the Meeting estimated a maximum residue level of 2 mg/kg for rice. The Meeting estimated an STMR value of 0.57 mg/kg for cypermethrin residues in rice.

Sugar cane

In USA, zeta-cypermethrin is registered for use on sugar cane at 0.056 kg ai/ha with a 21-days PHI.

In nine zeta-cypermethrin trials on sugar cane in USA with conditions in line with GAP, residues in cane stems (foliage removed) on days 20-21 after the final application were: < 0.01 (4), < 0.05 (2), 0.05, 0.09 and 0.17 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for cypermethrin in sugar cane of 0.2, 0.05 and 0.17 mg/kg respectively.

Almond

No suitable GAP was available for evaluating the alpha-cypermethrin trials on almond.

Cotton

In Colombia, alpha-cypermethrin is registered for use on cotton at 0.035 kg ai/ha with a 15-days PHI.

In two alpha-cypermethrin trials on cotton in Colombia with conditions in line with GAP (± 30% application rate), residues in cotton seed were below LOQ (0.01 mg/kg).

In South Africa, alpha-cypermethrin is registered for use on cotton at 0.035 kg ai/ha with a 28-days PHI.

In one alpha-cypermethrin trial on cotton in South Africa with conditions approximating GAP (application rate 0.03 kg ai/ha and PHI 16 days), residues in cotton seed were below LOQ (0.01 mg/kg).

In Greece, alpha-cypermethrin is registered for use on cotton at 0.03 kg ai/ha with a 7-days PHI.

In eight alpha-cypermethrin trials on cotton in Greece (3) and Spain (5) with conditions in line with Greek GAP (± 30% application rate), residues in cotton seed were mostly below LOQ: < 0.01 (7) and 0.02 mg/kg.

In Italy, cypermethrin is registered for use on cotton at a spray concentration of 0.005 kg ai/hL with a 21-days PHI.

In eight cypermethrin trials on cotton in Greece (4) and Spain (4) with application spray concentrations 2× to 3× concentration specified by Italian GAP and with sampling 21 days after the final treatment, residues in cotton seed were all less than LOD (0.015 mg/kg).

In Brazil, zeta-cypermethrin is registered for use on cotton at an application rate of 0.05 kg ai/ha and with a PHI of 15 days.

In seven zeta-cypermethrin trials on cotton in Brazil with conditions in line with GAP (± 30% application rate), residues in cotton seed were all below LOQ: < 0.02 (4) and < 0.05 mg/kg (3). Parallel trials with 2× application rate also produced no residues above LOQ.

No suitable GAP was available to evaluate the other cotton seed data.

Peanuts

In USA, zeta-cypermethrin is registered for use on peanuts at 0.056 kg ai/ha with a 7-days PHI.

In 11 zeta-cypermethrin trials on peanuts in USA with conditions in line with GAP, residues in peanut kernels on day 7 after the final application were all non-detects (< 0.02 mg/kg). The LOQ for the analyses was 0.05 mg/kg.

Linseed

In Belgium, alpha-cypermethrin may be used on linseed at 0.013 kg ai/ha with no specified PHI.

In two alpha-cypermethrin trials on linseed in France with conditions in line with Belgian GAP (± 30% application rate), residues in linseed were both below LOQ: < 0.01 mg/kg.

The Meeting noted that the linseed data were consistent with data from the other oilseeds, where the residues do not generally penetrate the seed pods to reach the seeds.

Oilseed rape

In France, alpha-cypermethrin may be used on oilseed rape at 0.011 kg ai/ha with a PHI of 49 days.

In 21 alpha-cypermethrin trials on oilseed rape in France (10), Germany (9) and Spain (2) with conditions in line with French GAP (± 30% application rate), residues in rape seed were: < 0.01 (8), < 0.05 (11), 0.06 and 0.42 mg/kg. The Meeting noted that the 0.42 mg/kg residue was reported in an old trial (1986) with no field or laboratory reports, so it was not possible to confirm the validity of this residue value, which seemed out-of-context. The residue value was disregarded. This data set was used for maximum residue level estimation.

In Poland, cypermethrin is registered for use on oilseed rape at 0.03 kg ai/ha with a PHI of 21 days.

In nine cypermethrin trials on oilseed rape in France (2), Greece (4) and Spain (3) with conditions in line with Polish GAP (± 30% application rate), residues in rape seed were: < 0.003 (5), < 0.01 (3) and 0.01 mg/kg.

In Germany, zeta-cypermethrin is registered for use on oilseed rape at 0.01 kg ai/ha with a PHI of 56 days.

In six zeta-cypermethrin trials on oilseed rape in Germany (4) and the UK (2) with conditions in line with German GAP (± 30% application rate), residues in rape seed were: < 0.01 mg/kg (6).

Oilseed group – summary

The Meeting noted that cotton seed, peanuts and oilseed rape are major commodities of the oilseeds group and that the oilseed rape data produced the highest estimated maximum residue level.

On the basis of the alpha-cypermethrin oilseed rape data from trials in France, Germany and Spain with conditions aligned with French GAP, the Meeting estimated a maximum residue level of 0.1 mg/kg for oilseed to replace the previous recommendations for peanut and oilseed except peanut. The Meeting estimated an STMR value of 0.05 mg/kg for cypermethrin residues in oilseed.

Cacao and coffee

In Malaysia, alpha-cypermethrin may be used on cacao at 0.01 kg ai/ha (200 l/ha spray) with a PHI of 7 days.

In an alpha-cypermethrin trial on cacao in Malaysia with conditions in line with GAP (spray concentration 0.005 kg ai/hL), residues in cocoa on day 7 after the final application were < 0.01 mg/kg.

The data were insufficient to support the estimate of a maximum residue level for cacao.

No suitable GAP was available to evaluate the alpha-cypermethrin data on coffee.

Zeta-cypermethrin may be used on coffee in Brazil at 0.015 kg ai/ha with a 14-days PHI.

In five zeta-cypermethrin trials on coffee in Brazil with conditions in line with GAP (± 30% application rate), residues in coffee beans were: < 0.05 mg/kg (5). In 2 more trials at higher application rates (0.04 kg ai/ha), residues were also below LOQ (< 0.05 mg/kg).

On the basis of the zeta-cypermethrin trials on coffee in Brazil, the Meeting estimated a maximum residue level of 0.05* mg/kg for coffee beans, confirming the previous recommendation. The Meeting estimated an STMR value of 0 mg/kg for cypermethrin residues in coffee beans.

Parsley

No suitable GAP was available to evaluate the single trial on parsley.

Dried Chilli pepper

The 2007 JMPR recommended that, where the residues on fresh Chilli peppers are available, a concentration factor of 7 should be used for the estimation of maximum residue levels in dried Chilli peppers. The concentration factor should be used to multiply the actually measured residue values in the fresh chilli peppers.

In Thailand, cypermethrin is registered for use on Chilli peppers at a high-volume spray concentration of 0.025 kg ai/hL with harvest 7 days later. In six Chilli pepper trials from Thailand with cypermethrin spray concentration 0.019 kg ai/hL (24% below GAP concentration, but within tolerance), residues 7 days after spraying were (rank order, median underlined): 0.24, 0.25, <u>0.45</u>, <u>0.54</u>, 0.62 and 0.69 mg/kg.

Conversion of the fresh Chilli pepper data to dried Chilli pepper data (multiply by 7) produces: 1.7, 1.8, <u>3.2</u>, <u>3.8</u>, 4.3 and 4.8 mg/kg.

On the basis of the cypermethrin trials on Chilli peppers in Thailand and a processing factor of 7, the Meeting estimated a maximum residue level of 10 mg/kg for dried Chilli peppers. The Meeting estimated STMR and HR values of 3.5 and 4.8 mg/kg respectively for cypermethrin residues in dried Chilli peppers.

Alfalfa

No suitable GAP was available to evaluate the alpha-cypermethrin or cypermethrin trials on alfalfa.

In USA, zeta-cypermethrin is registered for use on alfalfa at 0.056 kg ai/ha with a 3-days PHI for cutting or grazing.

In zeta-cypermethrin trials on alfalfa in USA with conditions in line with GAP, residues in alfalfa hay on day 3 after an application were: 8.2, 9.0, 9.5, 11, 14 and 18 mg/kg. After an allowance for 89% dry matter in alfalfa hay, the median and high residue become 11.5 and 20 mg/kg, respectively. This data set was used for maximum residue level estimation.

In six zeta-cypermethrin trials (each with 3 cuts, highest residue chosen) on alfalfa in USA with conditions in line with GAP, residues in alfalfa forage on day 3 after an application were: 2.3, 2.8, 3.5, 3.8, 4.5 and 11 mg/kg.

On the basis of the zeta-cypermethrin trials on alfalfa in USA, the Meeting estimated a high residue level and an STMR value of 11 and 3.65 mg/kg respectively for cypermethrin residues in alfalfa forage. The Meeting also estimated a maximum residue level, an STMR value and a high residue level of 30, 11.5 and 20 mg/kg respectively, for cypermethrin residues in alfalfa hay.

Pea fodder and forage

In Denmark, alpha-cypermethrin is registered for use on peas at an application rate of 0.015 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the high residue on the plant material was accepted as residues on pea forage.

In 29 alpha-cypermethrin trials on peas in Denmark (2), France (4), Germany (4), Netherlands (2) and the UK (17) with conditions in line with Danish GAP (± 30% application rate), residues in pea forage were (rank order, median underlined):0.06, 0.07, 0.07, 0.08, 0.16, 0.23, 0.25, 0.25, 0.28, 0.29, 0.35, 0.42, 0.42, 0.43, 0.45, 0.48, 0.51, 0.56, 0.62, 0.64, 0.64, 0.65, 0.65, 0.65, 0.71, 0.74, 0.80, 0.83 and 0.86 mg/kg.

Samples described as 'haulms' are accepted as straw.

In 10 alpha-cypermethrin trials on peas in France (4), Germany (2), and the UK (4) with conditions in line with Danish GAP (± 30% application rate), residues in pea straw were (rank order, median underlined): 0.24, 0.27, 0.27, 0.35, 0.37, 0.37, 0.39, 0.55, 0.58 and 1.0 mg/kg. After an allowance for 88% dry matter in pea hay (or straw), the median and high residue become 0.42 and 1.1 mg/kg, respectively. This data set was used for maximum residue level estimation.

In Greece, alpha-cypermethrin is registered for use on peas at an application rate of 0.03 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue on the plant material was accepted as residues on pea forage.

In three alpha-cypermethrin trials on peas in, France (1), Italy (1) and Spain (1) with conditions in line with Greek GAP (± 30% application rate), residues in pea forage were: 0.27, 0.72 and 1.0 mg/kg.

In four alpha-cypermethrin trials on peas in, France (1), Greece (1), Italy (1) and Spain (1) with conditions in line with Greek GAP (± 30% application rate), residues in pea straw were: 0.23, 1.1, 1.2 and 1.5 mg/kg.

In Spain, cypermethrin is registered for use on peas with a spray concentration of 0.01 kg ai/hL.

In three cypermethrin trials on peas in France (2) and Germany (1) with conditions in line with Spanish GAP (± 30% application rate), residues in pea straw were: 1.4, 2.6 and 4.1 mg/kg.

In France, zeta-cypermethrin is registered for use on peas at 0.018 kg ai/ha.

In 17 zeta-cypermethrin trials on peas in France (4), Italy (4) and the UK (9) with conditions in line with French GAP (± 30% application rate), residues in pea straw were: < 0.02, 0.03, < 0.05, 0.10, 0.13, 0.17, 0.19, 0.22, 0.28, 0.3, 0.33, 0.39, 0.41, 0.5, 0.66, 0.99 and 1.0 mg/kg.

On the basis of the 10 alpha-cypermethrin trials on peas in France, Germany and the UK matching Danish GAP, the Meeting estimated a maximum residue level, an STMR value and a high residue level of 2, 0.42 and 1.1 mg/kg respectively for cypermethrin residues in pea hay or pea fodder.

On the basis of the alpha-cypermethrin trials on peas matching Danish GAP, the Meeting estimated an STMR value and a high residue level of 0.45 and 0.86 mg/kg respectively for cypermethrin residues in pea forage (pea vines, green).

Bean fodder and forage

In France, alpha-cypermethrin may be used on beans at 0.03 kg ai/ha. No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue on the plant material was accepted as residues on bean forage.

In 18 alpha-cypermethrin trials on beans in France (10), Greece (1), Italy (2), Spain (2) and the UK (3) with conditions in line with French GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.07, 0.26, 0.38, 0.50, 0.53, 0.84, 0.86, 0.89, 0.91, 0.92, 0.92, 0.98, 1.0, 1.1, 1.4, 1.4, 1.4 and 1.5 mg/kg.

In seven alpha-cypermethrin trials on beans in France (1), Italy (1), Spain (2) and the UK (3) with conditions in line with French GAP (± 30% application rate), residues in bean straw were (rank order, median underlined): 0.32, 0.32, 0.49, 0.51, 0.73, 0.76 and 1.1 mg/kg. Bean straw was assumed to have the same dry matter content as pea hay or straw. After an allowance for 88% dry matter in bean straw, the median and high residues become 0.58 and 1.3 mg/kg, respectively. This data set was used for maximum residue level estimation.

In Denmark, alpha-cypermethrin may be used on beans at 0.015 kg ai/ha.

In 18 alpha-cypermethrin trials on beans in Belgium (2), France (4), Germany (2), Netherlands (4) and the UK (6) with conditions in line with Danish GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.22, 0.25, 0.25, 0.28, 0.33, 0.34, 0.34, 0.36, 0.37, 0.39, 0.39, 0.39, 0.42, 0.52, 0.52, 0.54, 0.82 and 0.86 mg/kg.

In 12 alpha-cypermethrin trials on beans in France (4), Netherlands (2) and the UK (6) with conditions in line with Danish GAP (± 30% application rate), residues in bean straw were (rank order, median underlined): 0.07, 0.31, 0.36, 0.39, 0.39, 0.40, 0.44, 0.49, 0.54, 0.58, 0.59 and 0.64 mg/kg.

In Spain, cypermethrin may be applied to beans with a spray concentration of 0.01 kg ai/hL.

In seven cypermethrin trials on beans in France (1), Germany (2), Italy (1), Spain (2) and the UK (1) with conditions in line with Spanish GAP (± 30% application rate), residues in bean forage were (rank order, median underlined): 0.44, 0.49, 0.52, 0.71, 1.5, 1.8 and 2.1 mg/kg.

Zeta-cypermethrin may be used on beans in the UK at 0.015 kg ai/ha.

In four zeta-cypermethrin trials on beans in the UK with conditions in line with GAP (± 30% application rate), residues in bean straw were: 0.13, 0.26, 0.30 and 0.47 mg/kg.

On the basis of the seven alpha-cypermethrin trials on beans (bean straw data) in France, Italy, Spain and the UK matching French GAP, the Meeting estimated a maximum residue level, an STMR value and a high residue level of 2, 0.58 and 1.3 mg/kg respectively for cypermethrin residues in bean fodder.

On the basis of the cypermethrin trials on beans matching Spanish GAP, the Meeting estimated a high residue level and an STMR value of 2.1 and 0.71 mg/kg respectively for cypermethrin residues in bean forage.

Barley straw and fodder

No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue in the plant material was accepted as residues in barley forage. In some trials multiple samplings at various time intervals from 0 days up to approximately 3 weeks were available, while in

other trials only one sampling, most often day zero, was available. Residue concentrations in forage were quite persistent; for example, residue concentrations in plant material 2 or 3 weeks after treatment sometimes exceeded the measured values at day 0.

In Denmark, alpha-cypermethrin may be used on barley at 0.015 kg ai/ha.

In 28 alpha-cypermethrin trials on barley in Denmark (2), France (4), Germany (14), Greece (2), Italy (2), Spain (2) and the UK (2) with conditions in line with Danish GAP (± 30% application rate), residues in barley forage (plant) were (rank order, median underlined): 0.16, 0.20, 0.23, 0.24, 0.28, 0.30, 0.32, 0.34, 0.35, 0.35, 0.35, 0.36, 0.38, 0.38, 0.40, 0.41, 0.44, 0.45, 0.49, 0.52, 0.52, 0.52, 0.57, 0.62, 0.66, 0.67, 0.72 and 0.80 mg/kg.

In 31 alpha-cypermethrin trials on barley in France (8), Germany (16), Greece (2), Italy (2), Spain (2) and the UK (2) with conditions in line with Danish GAP (± 30% application rate), residues in barley straw were (rank order, median underlined): < 0.01 (4), 0.05, 0.06, 0.08, 0.17, 0.22, 0.22, 0.22, 0.22, 0.22, 0.24, 0.29, 0.30, 0.32, 0.34, 0.37, 0.38, 0.46, 0.48, 0.53, 0.54, 0.66, 0.68, 0.70, 0.73, 0.83, 0.83, 0.89 and 1.1 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.34 and 1.2 mg/kg, respectively.

In Poland, cypermethrin may be used on cereals at 0.03 kg ai/ha.

In four cypermethrin trials on barley in France (1), Hungary (1), Poland (1) and the UK (1) with conditions in line with Polish GAP (± 30% application rate), residues in barley forage (plant) were: 0.37, 0.48, 0.51 and 0.72 mg/kg.

In seven cypermethrin trials on barley in France (2), Hungary (1), Poland (2) and the UK (2) with conditions in line with Polish GAP (± 30% application rate), residues in barley straw were: 0.30, 0.33, 0.33, 0.33, 0.37, 0.40, 0.62 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.37 and 0.70 mg/kg, respectively.

In Germany, zeta-cypermethrin may be used on barley at 0.015 kg ai/ha.

In 10 zeta-cypermethrin trials on barley in France (1), Germany (4), Italy (2), Spain (1) and the UK (2) with conditions in line with German GAP (± 30% application rate), residues in barley forage (plant) were: 0.08, 0.11, 0.15, 0.29, 0.33, 0.33, 0.46, 0.75, 0.94 and 1.4 mg/kg.

In 13 zeta-cypermethrin trials on barley in France (2), Germany (4), Italy (2), Spain (1) and the UK (4) with conditions in line with German GAP (± 30% application rate), residues in barley straw were: < 0.05 (2), 0.08, 0.13, 0.14, 0.19, 0.20, 0.25, 0.32, 0.52, 0.67, 1.8 and 2.1 mg/kg. After an allowance for 89% dry matter in barley straw, the median and high residues become 0.22 and 2.4 mg/kg, respectively.

The Meeting noted that the highest STMR and highest 'high residue' did not necessarily originate from the same compound for barley straw and forage. The highest values were chosen for the final estimates.

On the basis of the zeta-cypermethrin trials on barley matching German GAP, the Meeting estimated a high residue level of 1.4 mg/kg for cypermethrin residues in barley forage. On the basis of alpha-cypermethrin trials on barley matching Danish GAP, the Meeting estimated an STMR value of 0.39 mg/kg for barley forage.

Maize fodder and forage

In France, alpha-cypermethrin may be used on maize at 0.03 kg ai/ha.

In four alpha-cypermethrin trials on maize in France with conditions in line with GAP, residues in maize plants and silage were: < 0.01 (2), 0.19 and 0.32 mg/kg.

No suitable GAP was available to evaluate the cypermethrin trials on maize fodder and forage.

In USA, zeta-cypermethrin is registered for use on maize at 0.056 kg ai/ha, with PHIs of 30 days for stover (fodder) and 60 days for forage (silage). Zeta-cypermethrin is also registered for use on sweet corn at 0.056 kg ai/ha.

In 19 zeta-cypermethrin trials on maize in USA with conditions in line with GAP, residues in maize forage were all below LOQ and most below LOD: < 0.01 (12), < 0.05 (6) and < 0.1 mg/kg.

In 24 zeta-cypermethrin trials on maize and sweet corn in USA with conditions in line with GAP, residues in maize stover (fodder) were: < 0.05, < 0.5, 0.55, 0.64, 0.73, 0.77, 0.91, 0.95, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.5, 1.5, 1.7, 1.7, 1.7, 2.4, 2.4, 2.4, 3.0 and 4.7 mg/kg. After an allowance for 83% dry matter in maize stover, the median and high residue become 1.6 and 5.7 mg/kg, respectively.

In France, zeta-cypermethrin may be used on maize at 0.0375 kg ai/ha.

In 14 zeta-cypermethrin trials on maize in France with conditions in line with GAP, residues in maize silage were: < 0.05 (13) and 0.10 mg/kg.

On the basis of the zeta-cypermethrin trials on maize (data on maize silage) matching French GAP, the Meeting estimated a high residue value and an STMR value of 0.1 and 0.05 mg/kg respectively for cypermethrin residues in maize forage.

Oats straw and fodder

In Germany, alpha-cypermethrin may be used on cereals at 0.013 kg ai/ha, with a PHI of 35 days.

In seven alpha-cypermethrin trials on oats in Germany with conditions in line with GAP, residues in oats straw were: 0.08, 0.31, 0.43, 0.44, 0.45, 0.56 and 0.75 mg/kg. After an allowance for 90% dry matter in oats straw, the median and high residues become 0.49 and 0.83 mg/kg, respectively.

No suitable GAP was available to evaluate the zeta-cypermethrin trials on oats straw.

Rice straw and fodder

No suitable GAP was available to evaluate the alpha-cypermethrin trials on rice straw and fodder.

In USA, zeta-cypermethrin is registered for use on rice at 0.056 kg ai/ha with a PHI of 14 days.

In 22 zeta-cypermethrin trials on rice in USA with conditions in line with US GAP, residues in rice straw (rank order, median underlined) were: 0.11, 0.15, 0.16, 0.27, 0.29, 0.32, 0.34, 0.35, 0.35, 0.37, 0.39, 0.49, 0.49, 0.57, 0.60, 0.61, 0.64, 0.65, 0.79, 1.4, 1.5 and 1.8 mg/kg. After an allowance for 90% dry matter in rice straw, the median and high residue become 0.49 and 2.0 mg/kg, respectively.

Wheat straw and fodder

No information was available on restrictions on cutting and grazing, so, in each trial, the highest residue in the plant material was accepted as residues in wheat forage. In some trials multiple samplings at various time intervals from 0 days up to approximately 4-5 weeks were available, while in other trials only one sampling, most often day zero, was available. Residues in the plant material were quite persistent; for example residues 3-4 weeks after treatment sometimes exceeded the day 0 residues. In some trials, multiple sampling times for wheat straw were also available.

In Denmark, alpha-cypermethrin may be used on wheat at 0.015 kg ai/ha.

In 28 alpha-cypermethrin trials on wheat in Belgium (2), France (6), Germany (12), Greece (2), Italy (2), Spain (2) and the UK (2), with conditions in line with Danish GAP (± 30% application rate), residues in wheat plants were: 0.04, 0.06, 0.16, 0.18, 0.19, 0.21, 0.23, 0.23, 0.23, 0.25, 0.28, 0.32, 0.36, 0.38, 0.38, 0.41, 0.43, 0.47, 0.47, 0.48, 0.53, 0.54, 0.54, 0.55, 0.58, 0.62, 0.62 and 1.4 mg/kg.

In 60 alpha-cypermethrin trials on wheat in Belgium (2), France (23), Germany (27), Greece (2), Italy (2), Spain (2) and the UK (2), with conditions in line with Danish GAP (± 30% application

rate), alpha-cypermethrin residues in wheat straw were: 0.01, 0.01, 0.02, 0.03, 0.03, 0.05, 0.06, 0.08, 0.09, 0.15, 0.15, 0.16, 0.16, 0.16, 0.17, 0.17, 0.19, 0.20, 0.21, 0.25, 0.27, 0.29, 0.30, 0.32, 0.34, 0.34, 0.37, 0.37, 0.37, 0.37, 0.38, 0.44, 0.44, 0.47, 0.48, 0.48, 0.50, 0.52, 0.54, 0.54, 0.58, 0.58, 0.60, 0.62, 0.66, 0.68, 0.73, 0.75, 0.75, 0.81, 0.91, 0.92, 0.94, 0.95, 1.1, 1.2, 1.3, 1.5, 1.7 and 2.2 mg/kg.

In France, cypermethrin is registered for use on cereals at 0.025 kg ai/ha.

In four cypermethrin trials on wheat in Germany (1), Hungary (1), Poland (1) and the UK (1), with conditions in line with French GAP (± 30% application rate), residues in wheat plants were: 0.15, 0.36, 0.43 and 1.1 mg/kg.

In nine cypermethrin trials on wheat in France (1), Germany (2), Hungary (2), Poland (2) and UK (2), with conditions in line with French GAP (± 30% application rate), residues in wheat straw were: < 0.01, 0.21, 0.25, 0.26, 0.35, 0.43, 0.44, 0.48 and 0.57 mg/kg.

In Germany, zeta-cypermethrin is registered for use on wheat at 0.015 kg ai/ha.

In 11 zeta-cypermethrin trials on wheat in France (1), Germany (5), Italy (2), Spain (1) and the UK (2), with conditions in line with German GAP (± 30% application rate), residues in wheat plant were: 0.09, 0.13, 0.17, 0.22, 0.26, 0.38, 0.38, 0.57, 0.58, 0.74 and 0.86 mg/kg.

In 15 zeta-cypermethrin trials on wheat in France (3), Germany (5), Italy (2), Spain (1) and the UK (4), with conditions in line with German GAP (± 30% application rate), residues in wheat straw were: < 0.05, < 0.05, 0.08, 0.12, 0.12, 0.14, 0.18, 0.19, 0.19, 0.21, 0.27, 0.38, 0.5, 1.0 and 1.4 mg/kg.

In USA, zeta-cypermethrin is registered for use on wheat at 0.056 kg ai/ha with a 14-days PHI for grain, forage or hay harvest.

In 16 zeta-cypermethrin trials on wheat in USA in line with GAP, residues in wheat hay were: 0.61, 1.2, 1.5, 1.7, 1.7, 1.9, 2.1, 2.2, 2.5, 2.7, 3.2, 3.4, 3.8, 4.9, 5.3 and 5.5 mg/kg.

In 16 zeta-cypermethrin trials on wheat in USA in line with GAP, residues in wheat straw were: 0.70, 0.93, 0.98, 1.2, 1.8, 1.9, 2.2, 3.2, 3.2, 3.7, 3.8, 3.8, 3.9, 5.2, 6.0 and 6.1 mg/kg. After an allowance for 88% dry matter in wheat straw, the median and high residues become 3.6 and 6.9 mg/kg, respectively. This data set was used for maximum residue level estimation.

On the basis of the alpha-cypermethrin trials on wheat matching Danish GAP, the Meeting estimated a high residue level and an STMR value of 1.4 and 0.38 mg/kg respectively for cypermethrin residues in wheat forage.

Straw and fodder of cereal grains – summary

The Meeting noted that barley, maize, oats, rice and wheat are major commodities of the cereal grains group and that the wheat straw data produced the highest estimated maximum residue level.

On the basis of the 16 zeta-cypermethrin trials on wheat (data on wheat straw) matching US GAP, the Meeting estimated a maximum residue level of 10 mg/kg for straw and fodder (dry) of cereal grains to replace the previous recommendation of 5 mg/kg. The Meeting estimated an STMR value and a high residue value of 3.6 and 6.9 mg/kg respectively, for cypermethrin residues in straw and fodder (dry) of cereal grains.

Sugar beet leaves or tops

Alpha-cypermethrin is registered for use on sugar beet crops in Germany with an application rate of 0.01 kg ai/ha and no specified PHI.

In 16 alpha-cypermethrin trials on sugar beet in Germany with conditions in line with GAP, the highest residues in sugar beet leaf on any day of the trial were: 0.10, 0.21, 0.24, 0.27, 0.29, 0.31, 0.34, 0.34, 0.37, 0.45, 0.50, 0.56, 0.75, 0.86, 1.1 and 1.9 mg/kg.

Alpha-cypermethrin is registered for use on sugar beet crops in Greece with an application rate of 0.03 kg ai/ha and a 14-days PHI.

In eight alpha-cypermethrin trials on sugar beet in France (1), Greece (2), Italy (3) and Spain (2) with conditions in line with Greek GAP, residues in sugar beet leaf were: 0.03, 0.05, 0.06, 0.06, 0.07, 0.07, 0.09 and 0.16 mg/kg.

The cypermethrin trials on sugar beet could not be evaluated because no suitable GAP was available.

In USA, zeta-cypermethrin is registered for use on sugar beet at 0.056 kg ai/ha with a 21-days PHI.

In eight zeta-cypermethrin trials in sugar beet in USA with conditions in line with GAP, residues in sugar beet tops on day 21 after the final application were: 0.25, 0.30, 0.34, 0.34, 0.36, 0.39, 0.40 and 0.55 mg/kg.

On the basis of the alpha-cypermethrin trials on sugar beet in Germany, the Meeting estimated an STMR value and a high residue value of 1.5 and 8.3 mg/kg for cypermethrin residues in sugar beet leaves or tops.

Cotton fodder

In Greece, alpha-cypermethrin is registered for use on cotton at 0.03 kg ai/ha with a 7-days PHI.

In six alpha-cypermethrin trials on cotton in Greece (3) and Spain (3) with conditions in line with Greek GAP (± 30% application rate), residues in cotton plants were: 0.20, 0.21, 0.34, 0.38, 0.46 and 0.55 mg/kg.

On the basis of the alpha-cypermethrin trials on cotton matching Greek GAP and the data on cotton plants, the Meeting estimated an STMR value and a high residue value of 0.36 and 0.55 mg/kg respectively for cypermethrin residues in cotton fodder.

Rapeseed forage

In France, alpha-cypermethrin may be used on oilseed rape at 0.011 kg ai/ha with a PHI of 49 days.

In 10 alpha-cypermethrin trials on oilseed rape in France (6), Germany (2) and Spain (2) with conditions in line with French GAP application rate (accept data from PHIs 29–35 days), residues in plant without pods were: .< 0.05 (8), 0.11 and 0.24 mg/kg.

On the basis of the alpha-cypermethrin trials on oilseed rape matching French GAP, the Meeting estimated an STMR value and a high residue value of 0.05 and 0.24 mg/kg for cypermethrin residues in rapeseed forage.

Hops

No suitable GAP was available to evaluate the alpha-cypermethrin trials on hops.

Tea

No suitable GAP was available to evaluate the alpha-cypermethrin trials on tea. The Meeting withdrew the previous recommendation of 20 mg/kg for green and black tea.

Fate of residues during processing

The Meeting received information on the fate of alpha-cypermethrin residues during the processing of barley, grapes, olives, cabbage, gherkins, tomatoes, oilseed rape and oil palm; the fate of cypermethrin residues during the processing of wheat; and the fate of zeta-cypermethrin residues during the processing of apples, beans, maize, peach, peanuts, peas, plum, soya bean, spinach, sugar beet, sugar cane, sunflower seed, tomato and wheat.

Also information was provided on hydrolysis studies of alpha-cypermethrin and cypermethrin to assist with identification of the nature of the residue during processing.

Alpha-cypermethrin and cypermethrin were stable during hydrolysis conditions simulating pasteurisation, baking, brewing and boiling. Approximately 10–15% of alpha-cypermethrin was hydrolysed during sterilisation (pH 6, 120 ˚C for 20 minutes). DCVA and 3-phenoxybenzaldehyde were identified as the hydrolysis products. Cypermethrin was not tested under sterilisation conditions.

Processing factors have been calculated for residues of the cypermethrins in a number of food processes (following table). Factors are indicated with a'<' (less-than) sign when the residue in the processed commodity is below the LOQ of the analytical method. The calculation is then made on the LOQ of the analytical method and the residue concentration in the RAC. The median of observed values or the best estimate of the processing factors are summarized in the final column of the table.

The Meeting agreed that, because the common composition of the three compounds, a food processing factor obtained for residues of one compound would apply to the residues of the others in the current residue evaluation.

Calculated processing factors and the median or best estimate are summarized in the following table. Only those processes are included in the table that lead to STMR-P or HR-P values useful for dietary intake estimations or for livestock dietary burden calculations. Other processes and processing factors are provided in the monographs.

Compound	raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors.	Median or best estimate
Alpha-cypermethrin	barley	beer	< 0.17, < 0.5, < 0.03, < 0.04, < 0.04, < 0.09	< 0.03
Alpha-cypermethrin	grapes	pomace	1.8, 2.4, 2.8, 3.2, 3.2, 3.3, 4.6, 5.7	3.2
Alpha-cypermethrin	grapes	raisins	3.2, 3.4, 3.2, 3.4	3.3
Alpha-cypermethrin	grapes	wine	< 0.17, < 0.17, < 0.2, < 0.2, < 0.08, < 0.08, < 0.2, < 0.2	< 0.08
Alpha-cypermethrin	olives	oil meal	0.08, 0.09, 0.12, 0.25	0.11
Alpha-cypermethrin	olives	olive oil, crude	3.3, 4.6, 6.6, 8.5, 17.4, 13.9,	7.5
Alpha-cypermethrin	olives	olive oil, refined	6.1, 7.2, 9.3, 12.7	8.2
Alpha-cypermethrin	olives	olives, fermented	1.1, 1.1, 1.6, 2.0	1.3
Zeta-cypermethrin	plum	dried prune	3.6, 2.8	3.2
Alpha-cypermethrin	rape seed	crude rape seed oil	0.81, 1.6	1.6
Alpha-cypermethrin	rape seed	refined rape seed oil	1.0, 1.3	1.2
Alpha-cypermethrin	tomato	canned tomatoes	< 0.11, < 0.16, < 0.16, < 0.25	< 0.11
Alpha-cypermethrin	tomato	tomato juice	0.22, 0.25, 0.33, 0.33	0.29
Alpha-cypermethrin	tomato	tomato paste	1.0, 1.0, 1.1, 1.8	
Zeta-cypermethrin	tomato	tomato paste	< 0.56	
Summary	tomato	tomato paste	< 0.56, 1.0, 1.0, 1.1, 1.8	1.0
Zeta-cypermethrin	tomato	tomato puree	< 0.56	
Alpha-cypermethrin	tomato	tomato purée	0.33, 0.5, 0.5, 0.7	
Summary	tomato	tomato purée	0.33, 0.5, 0.5, < 0.56, 0.7	0.5
Cypermethrin	wheat grain	bran	2.6, 2.4	
Zeta-cypermethrin	wheat	bran	1.4	
Summary	wheat	bran	1.4, 2.4, 2.6	2.4
Cypermethrin	wheat grain	flour	0.27, 0.43	
Zeta-cypermethrin	wheat	flour	< 0.56	
Summary	wheat	flour	0.27, 0.43, < 0.56	0.43
Zeta-cypermethrin	wheat	germ	< 0.56	< 0.56

The processing factor for dried prunes (3.2) was applied to the estimated STMR and HR for plums (stone fruits 0.59 and 0.94 mg/kg) to produce STMR-P and HR-P values for dried prunes of 1.9 and 3.0 mg/kg respectively. The estimated HR-P falls below the estimated maximum residue level for stone fruits, so a separate maximum residue level for dried prunes is not needed.

The processing factors for grape pomace (3.2), and wine (< 0.08) were applied to the estimated STMR for grapes (0.01 mg/kg) to produce STMR-P values for grape pomace (0.032 mg/kg) and wine (< 0.001 mg/kg).

The processing factor for dried grapes (3.3) was applied to the estimated STMR and HR for grapes (0.01 and 0.09 mg/kg) to produce STMR-P and HR-P values for dried grapes (raisins) of 0.033 and 0.30 mg/kg, respectively.

The Meeting estimated a maximum residue level for cypermethrin in dried grapes (= currants, raisins, sultanas) of 0.5 mg/kg.

The processing factors for tomato puree (0.5), tomato juice (0.29) and canned tomato (< 0.11) were applied to the estimated STMR for tomatoes (0.05 mg/kg) to produce STMR-P values for tomato puree (0.025 mg/kg), tomato juice (0.015 mg/kg) and canned tomato (0.006 mg/kg).

The processing factors for crude olive oil (7.5) and refined olive oil (8.2) were applied to the estimated STMR for olives (0.05 mg/kg) to produce STMR-P values for crude olive oil (0.38 mg/kg) and refined olive oil (0.41 mg/kg)

The Meeting estimated a maximum residue level of 0.5 mg/kg for cypermethrin in both virgin olive oil and refined olive oil.

The processing factors for crude rape seed oil (1.6) and refined rape seed oil (1.2) were applied to the estimated STMR for rape seed (0.05 mg/kg) to produce STMR-P values for crude rape seed oil (0.08 mg/kg) and refined rape seed oil (0.06 mg/kg). These concentrations fall below the estimated maximum residue level for oilseeds, so maximum residue levels for the oils are not needed.

The processing factors for wheat bran (2.4), flour (0.43) and wheat germ (0.56) were applied to the estimated STMR for cereal grains (0.035 mg/kg) to produce STMR-P values for wheat bran (0.084 mg/kg), flour (0.015 mg/kg) and wheat germ (0.02 mg/kg).

The processing factor for beer from barley (< 0.03) was applied to the estimated STMR for barley grain (0.035 mg/kg) to produce an STMR-P value for beer of < 0.0011 mg/kg.

Residues in animal commodities

Livestock feeding

The meeting received lactating dairy cow feeding studies for alpha-cypermethrin and cypermethrin. The meeting also received laying hen feeding studies for alpha-cypermethrin and cypermethrin. The studies provided information on likely residues resulting in animal commodities, milk and eggs from residues of the cypermethrins in the animal diet.

Lactating dairy cows

Groups of 3 lactating Holstein dairy cows were dosed once daily via gelatin capsule with alpha-cypermethrin at nominal 4 ppm (1×), 12 ppm (3×) and 40 ppm (10×) in the dry-weight diet for 28 consecutive days. Milk was collected on 14 occasions for analysis. On day 29, within 24 h of the final dose, the animals were slaughtered for tissue collection.

Residues appeared in the fat but not in the other tissues, where residues were below LOQ (0.05 mg/kg) at the highest dose. The transfer factor between residue level in the fat and the dose (expressed as feed concentration) was similar for the three dosing levels. Residues in omental fat were: 4 ppm diet – < 0.05, 0.06 and 0.06 mg/kg; 12 ppm diet – 0.16, 0.14, 0.18 mg/kg; 40 ppm diet – 0.89, 0.42, 1.01 mg/kg.

Residue levels in milk quickly reached a plateau level, within 2 or 3 days. Again, the transfer factor between residue level in the milk and the dose (expressed as feed concentration) was similar for the two dosing levels where residues were measurable. No information was available on the residue level in milk fat.

Groups of 3 lactating Friesian-Holstein dairy cows were dosed orally once daily via gelatin capsule with cypermethrin at 0.028 mg/kg bw (1×), 0.085 mg/kg bw (3×) and 0.284 mg/kg bw (10×), for 28 consecutive days. Milk was collected throughout for analysis. Approximately 23 h after the final dose, the animals were slaughtered for tissue collection.

Cypermethrin residues were below LOQ (0.05 mg/kg) in muscle, kidney and liver at all dose levels. Cypermethrin residues were also below LOQ (0.005 mg/kg milk, 0.05 mg/kg tissue fat) in milk and tissue fat at the low dose. The residue levels in tissue fat at the 3× and 10× showed good proportionality.

Residue levels in milk reached a plateau within 3 days of the first dose and the composition of the cypermethrin (cis-trans ratio) also very soon reached a ratio of approximately 52:48 from the original 40:60. No information was available on the distribution of the residue between the fat and non-fat milk fractions.

In another study, groups of lactating Holstein dairy cows fitted with ear tags containing cypermethrin were dosed once daily via gelatin capsule with cypermethrin at 0 ppm, 5 ppm (1×), 15 ppm (3×) and 50 ppm (10×) in the diet, for 28 consecutive days. Milk was collected on 12 occasions for analysis. Animals from each group were slaughtered within 24 hours of the final dose for tissue collection.

Residue levels of cypermethrin reached a plateau in milk at some time between 5 and 15 days after dosing was initiated. Residues of cypermethrin were just detectable in fat and cream from the ear-tag use only (LOQ 0.01 mg/kg). Residues of cypermethrin did not appear in the liver even at the highest dose, but were present in kidney and muscle (LOQ 0.01 mg/kg). Residue levels were much higher in fat than in other tissues and were approximately proportional to the dosing levels.

Residue data were available on milk and cream from day 7 where the residue concentrations in cream were on average 7 times the concentration in milk. No information was available on the lipid or water content of the cream.

Laying hens

Three groups of laying hens were dosed once daily via gelatin capsule with alpha-cypermethrin at the intended equivalent of 1.2 ppm, (1×), 6.1 ppm (5×) and 12 ppm (10×) in the diet for 28 consecutive days. Actual equivalent dietary concentrations were: 1.6 ppm, 7.2 ppm and 15 ppm. Eggs were collected approximately 3 times per week. Most of the birds were slaughtered within 24 h of the final dose for tissue collection and analysis.

Residues in liver and muscle from the highest dose group did not exceed LOQ (0.05 mg/kg). Residues in abdominal fat were: 1.6 ppm diet – < 0.05 (3) mg/kg; 7.2 ppm diet – 0.086, 0.088, 0.082 mg/kg; 15 ppm diet – 0.21 0.26 0.24 mg/kg. Residues in eggs and fat did not exceed the LOQ (0.01 and 0.05 mg/kg, respectively) for the low dose group. Residues in eggs from the highest dose group reached levels of 0.02-0.035 mg/kg. Residues in eggs from the middle dose group were in the range < 0.01–0.013 mg/kg

In another study, three groups of laying White Leghorn hens were dosed via gelatin capsule with cypermethrin at the equivalent of 2 ppm (1×), 6 ppm (3×) and 20 ppm (10×) in the diet for 28 consecutive days. Eggs were collected daily. Birds were slaughtered within 24 hours of the final dose for tissue collection.

Residues did not appear in the liver or muscle from the high dose group (LOQ 0.05 mg/kg) or in the fat or eggs from the low dose group. Residues in the fat were: 6 ppm diet – 0.066, 0.086, < 0.05 mg/kg; 20 ppm diet – 0.13, 0.19, 0.17 mg/kg. Cypermethrin appears in the yolk and not the albumen in eggs, as expected of a fat-soluble compound.

Direct animal treatment

The Meeting received studies on the residues arising in livestock from external treatment with alpha-cypermethrin as an ectoparasiticide.

In a South African study, cattle were plunge dipped in a 12000 litre dip prepared from an alpha-cypermethrin SC formulation at a nominal concentration of 70 mg/L and one animal was slaughtered on each of 4 intervals after dipping, i.e.,7, 14, 21 and 28 days later.

Alpha-cypermethrin residues were not detected (limit of detection 0.02 mg/kg) in any of the tissues from dipped animals slaughtered 1, 7, 14 and 21 days after treatment. In the 28-day animal, residues were present in perirenal fat at 0.02 mg/kg, but were below the detection limit in omental fat, muscle, kidney and liver.

In a UK study, four lactating dairy cows were topically dosed along the mid-dorsal line from upper neck to top of tail with 10 ml of a radiolabelled alpha-cypermethrin formulation at a dose equivalent to 150 mg ai/ animal. Samples of milk were collected and one animal was slaughtered at each of 7, 14, 28 and 35 days after dosing.

Concentrations of ^{14}C expressed as alpha-cypermethrin were below the limit of reliable measurement (0.01–0.03 mg/kg) in all tissue samples. A peak of radioactivity in the milk was observed at 1–2 days after treatment (highest values 0.012 and 0.014 mg/kg), but the ^{14}C concentrations expressed as alpha-cypermethrin were generally below 0.01 mg/kg.

In a second UK study, 20 cattle were topically dosed along the mid-dorsal line from shoulder to tail with 10 mL of a Pour On alpha-cypermethrin formulation at a dose equivalent to 150 mg ai/ animal. Animals were slaughtered 3, 7, 14, 21 and 28 days after treatment. Residues in fat decreased from 0.02–0.14 mg/kg 3 days after topical treatment to < 0.01–0.04 mg/kg 28 days after treatment.

No suitable registered direct uses of alpha-cypermethrin on livestock were available to permit evaluation of the supervised trials data on direct animal treatments.

Farm animal dietary burden

The Meeting estimated the dietary burden of cypermethrin in livestock on the basis of the diets listed in Annex 6 of the 2006 JMPR Report (OECD Feedstuffs Derived from Field Crops). Calculation from highest residue, STMR (some bulk commodities) and STMR-P values provides the levels in feed suitable for estimating MRLs, while calculation from STMR and STMR-P values for feed is suitable for estimating STMR values for animal commodities.

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculations for beef cattle, dairy cattle, broilers and laying poultry are provided in Annex 6 of the 2008 Report of the JMPR. The calculations were made according to the livestock diets from US-Canada, EU and Australia in the OECD Table (Annex 6 of the 2006 Report of the JMPR).

	Livestock dietary burden, cypermethrin, ppm of dry matter diet					
	US-Canada		EU		Australia	
	max	mean	max	mean	max	mean
Beef cattle	20.7	7.9	24.4	8.3	31.4 [a]	11.3 [b]
Dairy cattle	13.8	5.3	17.1	7.6	21.6 [c]	8.3 [d]
Poultry - broiler	0.16	0.16	0.05	0.05	0.35	0.35
Poultry - layer	0.16	0.16	2.2 [e]	0.66 [f]	0.35	0.35

[a] Highest maximum beef or dairy cattle dietary burden suitable for MRL estimates for mammalian meat.

[b] Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian meat.

[c] Highest maximum dairy cattle dietary burden suitable for MRL estimates for milk.

[d] Highest mean dairy cattle dietary burden suitable for STMR estimates for milk.

[e] Highest maximum poultry dietary burden suitable for MRL estimates for poultry meat and eggs.

[f] Highest mean poultry dietary burden suitable for STMR estimates for poultry meat and eggs.

Animal commodity maximum residue levels

Cattle

For MRL estimation, the high residues in the tissues were calculated by interpolating the maximum dietary burden (31.4 ppm) between the relevant feeding levels (12 and 40 ppm) from the alpha-cypermethrin dairy cow feeding study and using the highest tissue concentrations from individual animals within those feeding groups.

The STMR values for the tissues were calculated by interpolating the STMR dietary burden (11.3 ppm) between the relevant feeding levels (4 and 12 ppm) from the alpha-cypermethrin dairy cow feeding study and using the mean tissue concentrations from those feeding groups.

For milk MRL estimation, the high residues in the milk were calculated by interpolating the maximum dietary burden (21.6 ppm) between the relevant feeding levels (12 and 40 ppm) from the alpha-cypermethrin dairy cow feeding study and using the mean milk concentrations from those feeding groups.

The STMR value for milk was calculated by interpolating the STMR dietary burden (8.3 ppm) between the relevant feeding levels (0 and 12 ppm, because residues at 4 ppm feeding were below LOQ) from the alpha-cypermethrin dairy cow feeding study and using the mean milk concentrations from those feeding groups.

In the table, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [] and estimated concentrations related to the dietary burdens are shown without brackets.

Dietary burden (ppm)					
Feeding level [ppm]	Milk	Muscle	Liver	Kidney	Fat
MRL					
	mean	highest	highest	highest	highest
MRL beef cattle (31.4) [12, 40]		0.04 [< 0.05, < 0.05]	0.04 [< 0.05, < 0.05]	0.04 [< 0.05, < 0.05]	0.76 [0.16, 1.01]
MRL dairy cattle (21.6) [12, 40]	0.031 0.016, 0.059]				
STMR					
	mean	mean	mean	mean	mean
STMR beef cattle (11.5) [4, 12, 40]		0.014 [< 0.05, < 0.05, < 0.05]	0.014 [< 0.05, < 0.05, < 0.05]	0.014 [< 0.05, < 0.05, < 0.05]	0.15 [0.057, 0.16, 0.77]
STMR dairy cattle (8.3) [0, 4, 12]	0.011 [0, < 0.01, 0.016]				

The data from the cattle feeding studies were used to support the estimation of maximum residue levels for mammalian meat and milk.

Residues in milk were estimated as 0.031 and 0.011 mg/kg resulting from the maximum (21.6 ppm) and STMR (8.3 ppm) dietary burdens respectively. A feeding study with cypermethrin in dairy cows showed that cypermethrin residue concentrations in the cream were, on average, 7 times the concentration in milk. With allowance of 50% fat in the cream, the estimated cypermethrin residues in milk fat were 0.43 and 0.15 mg/kg respectively from the two dietary burdens (0.031×7×2=0.43; 0.011×7×2=0.154).

The Meeting estimated a maximum residue level for cypermethrin in milks of 0.05 to replace the previous recommendation of 0.05 F mg/kg. The Meeting also estimated an STMR for milk of

0.011 mg/kg. The Meeting estimated a maximum residue level and an STMR value for milk fats of 0.5 and 0.15 mg/kg respectively.

The Meeting estimated a maximum residue level for cypermethrin in edible offal of 0.05* mg/kg, confirming the previous recommendation. The estimation is based on the liver and kidney data. The Meeting estimated an STMR value and an HR value of 0.014 and 0.04 mg/kg respectively for edible offal.

For muscle, the residue arising from a dietary burden of 31.4 ppm was below LOQ, 0.05 mg/kg. For fat, the residue arising from a dietary burden of 31.4 ppm was 0.76 mg/kg, while the residue resulting from a dietary burden of 11. 5 ppm was 0.15 mg/kg.

Because the available feeding study was on dairy cows and cypermethrin is fat-soluble with secretion in the milk, higher residues would be expected in the fat of beef cattle than in dairy cattle. The Meeting, allowing for the possible higher residues in beef cattle, estimated a maximum residue level for cypermethrin in mammalian meat (fat) of 2 mg/kg (an estimate for fat of dairy cows only would be 1 mg/kg). The Meeting estimated STMR and HR values for meat (fat) of 0.15 and 0.76 mg/kg respectively. The Meeting estimated STMR and HR values for meat (muscle) of 0.014 and 0.04 mg/kg respectively.

The Meeting was aware that CCRVDF had established veterinary drug MRLs for cypermethrin and alpha-cypermethrin in cattle muscle (50 µg/kg), cattle liver (50µg/kg), cattle kidney (50 µg/kg) and cattle fat (1000 µg/kg) and the same for sheep muscle (50 µg/kg), sheep liver (50µg/kg), sheep kidney (50 µg/kg) and sheep fat (1000 µg/kg).

The CCRVDF MRLs and the estimated maximum residue levels are apparently in agreement, except for the JMPR estimate of 2 mg/kg for mammalian meat (fat) and the CCRVDF value of 1000 µg/kg for cattle fat.

Poultry

In the table, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [] and estimated concentrations related to the dietary burdens are shown without brackets.

Dietary burden (ppm)				
Feeding level [ppm]	Eggs	Muscle	Liver	Fat
MRL				
	highest	highest	highest	highest
MRL laying hens (2.2) [0, 1.6, 7.2]	0.0033 [0, < 0.01, 0.011]	0.007 [0, < 0.05, < 0.05]	0.007 [0, < 0.05, < 0.05]	0.027 [0, < 0.05, 0.088]
STMR				
	mean	mean	mean	mean
STMR laying hens (0.66) [0, 1.6, 7.2]	0.001 [0, < 0.01, 0.011]	0.002 [0, < 0.05, < 0.05]	0.002 [0, < 0.05, < 0.05]	0.0.008 [0, < 0.05, 0.088]

The data from the laying hen feeding studies were used to support poultry meat and egg MRLs.

For poultry liver and muscle, residues were below LOQ (0.05 mg/kg) even at the 15 ppm feeding level, so an estimate of the STMRs was made by dividing the dietary burden (0.66 ppm) by 15 ppm and multiplying by the LOQ (0.05 mg/kg) to produce a value of 0.002 mg/kg. An estimate of the HRs was made by dividing the dietary burden (2.2 ppm) by 15 ppm and multiplying by the LOQ (0.05 mg/kg) to produce a value of 0.0007 mg/kg.

For eggs, residues were below LOQ (0.01 mg/kg) at the 1.6 ppm feeding level, so an estimate of the STMR was made by dividing the dietary burden (0.66 ppm) by 7.2 ppm and multiplying by the residue at that dosing level (0.011 mg/kg) to produce a value of 0.001 mg/kg. Similarly, a calculation for the HR for eggs produced a value of 0.0033 mg/kg.

The Meeting estimated a maximum residue level of 0.01* mg/kg for eggs to replace the previous recommendation. It also estimated an STMR value and an HR value of 0.001 and 0.0033 mg/kg respectively for poultry eggs.

The Meeting estimated a maximum residue level, an STMR value and an HR value of 0.05*, 0.002 and 0.007 mg/kg respectively for poultry edible offal.

The Meeting estimated a maximum residue level of 0.05*mg/kg for poultry meat (fat). The Meeting also estimated an STMR value of 0.002 (muscle) 0.008 (fat) and an HR value of 0.007 (muscle) 0.027 (fat) mg/kg, respectively.

RECOMMENDATIONS

On the basis of the data from supervised trials, the Meeting concluded that the residue concentrations listed below are suitable for establishing MRLs and for assessing IEDIs and IESTIs.

Definition of the residue (for compliance with the MRL and for estimation of dietary intake) for plant and animal commodities: cypermethrin (sum of isomers).

The residue is fat soluble.

CCN	Commodity	mg/kg MRL proposed	MRL previous	STMR or STMR-P	HR or HR-P	Source [d]
AL 1020	Alfalfa fodder	30		11.5	20	acZ
VS 0620	Artichoke, Globe	0.1		0.023	0.04	Ac
VS 0621	Asparagus	0.01*		0.01	0.01	Ac
GC 0640	Barley	W [a]	0.5			
AL 0061	Bean fodder	2		0.58	1.3	Acz
VP 0062	Beans, Shelled	W [a]	0.05*			
FB 0018	Berries and other small fruits	W [a]	0.5			
VB 0040	Brassica (cole or cabbage) vegetables, Head cabbages, Flowerhead brassicas	1	1	0.02	0.65	cAz
FT 0289	Carambola	0.2		0.02	0.09	C
GC 0080	Cereal grains, except rice	0.3		0.035		Acz
FS 0013	Cherries	W [a]	1			
FC 0001	Citrus fruits	W	2			
SB 0716	Coffee beans	0.05*	0.05*	0		aZ
VP 0526	Common bean (pods and/or immature seeds)	W [a]	0.5			
VC 0424	Cucumber	W [a]	0.2			
HS 0444	Chilli peppers (dry)	10		3.5	4.8	C
DF 0269	Dried grapes (=Currants, Raisins and Sultanas)	0.5		0.033	0.30	cA
FI 0334	Durian	1		0.135	0.47	C
MO 0105	Edible offal (mammalian)	0.05* [c]	0.05*	0.014	0.04	
VO 0440	Egg plant	0.03	0.2	0.01	0.02	A
PE 0112	Eggs	0.01*	0.05*	0.001	0.0033	
VC 0045	Fruiting vegetables, Cucurbits	0.07		0.01	0.05	cAz
FB 0269	Grapes	0.2		0.01	0.09	cA
VL 0480	Kale	W [a]	1			
VL 0053	Leafy vegetables	0.7		0.07	0.52	cAz
VA 0384	Leek	0.05	0.5	0.01	0.03	cA

CCN	Commodity	mg/kg MRL proposed	MRL previous	STMR or STMR-P	HR or HR-P	Source [d]
VP 0060	Legume vegetables	0.7		0.22	0.45	caZ
VL 0482	Lettuce, Head	W [a]	2			
FI 0343	Litchi	2		0.495	0.79	C
FI 0342	Longan	1		0.30	0.47	C
GC 0645	Maize	W [a]	0.05 *			
AS 0645	Maize fodder (dry)	W [a]	5 dry wt			
FI 0345	Mango	0.7		0.19	0.35	C
MM 0095	Meat (from mammals other than marine mammals)	2 (fat) [c]	0.2 (fat)	0.15 fat 0.014 muscle	0.76 fat 0.04 muscle	
VC 0046	Melons, except Watermelon	W [a]		0.01	0.01	
FM 0183	Milk fats	0.5	0.15			
ML 0106	Milks	0.05	0.05 F.	0.011		
VO 0450	Mushrooms	W	0.05*			
FS 0245	Nectarine	W [a]	2			
SO 0088	Oilseed	0.1		0.05		Acz
SO 0089	Oilseed, except peanut	W [a]	0.2			
VO 0442	Okra	0.5		0.08	0.20	C
OR 0305	Olive oil, refined	0.5		0.41		cA
OC 0305	Olive oil, virgin	0.5		0.38		cA
FT 0305	Olives	0.05*		0.05	0.05	cA
VA 0385	Onion, Bulb	0.01*	0.1	0.01	0.01	cAz
FI 0350	Papaya	0.5		0.135	0.23	C
AL 0072	Pea hay or Pea fodder (dry)	2		0.42	1.1	Acz
FS 0247	Peach	W [a] s	2			
SO 0697	Peanut	W [a]	0.05*			
VO 0051	Peppers	W	0.5			
VO 0444	Peppers, Chili	2		0.495	0.69	Cz
VO 0445	Peppers, Sweet	0.1		0.05	0.07	aZ
FS 0014	Plums (including prunes)	W [a]	1			
FP 0009	Pome fruits	0.7	2	0.205	0.56	aZ
PM 0110	Poultry meat	0.05* (fat)	0.05*	0.002 muscle 0.008 fat	0.007 muscle 0.027 fat	
PO 0111	Poultry, Edible offal of	0.05*		0.002	0.007	
DF 0014	Prunes	W [a]		1.9	3.0	
VD 0070	Pulses	0.05*		0.05		aZ
GC 0649	Rice	2		0.57		aZ
VR 0075	Root and tuber vegetables	W	0.05*			
VR 0075	Root and tuber vegetables (except sugar beet)	0.01*		0.01	0.01	ACz
AS 0651	Sorghum straw and fodder, dry	W [a]	5			
VD 0541	Soya bean (dry)	W [a]	0.05*			
VL 0502	Spinach	W [a]	2			
FS 0012	Stone fruits	2		0.59	0.94	aZ
AS 0081	Straw and fodder (dry) of cereal grains	10		3.6	6.9	acZ
FB 0275	Strawberry	0.07		0.01	0.05	A

CCN	Commodity	mg/kg MRL proposed	MRL previous	STMR or STMR-P	HR or HR-P	Source [d]
VR 0596	Sugar beet	0.1		0.01		Acz
GS 0659	Sugar cane	0.2		0.05	0.17	Z
VO 0447	Sweet corn (corn-on-the- cob)	0.05*	0.05*	0	0	Z
DT 1114	Tea, Green, Black	W	20			
VO 0448	Tomato	0.2	0.5	0.05	0.08	caZ
OR 0172	Vegetable oils, Edible	W [b]	0.5			
GC 0654	Wheat	W [a]	0.2			
AS 0654	Wheat straw and fodder, Dry	W [a]	5			
AL 1021	Alfalfa forage			3.65	11	
	Barley forage			0.39	1.4	
AL 1030	Bean forage (green)			0.71	2.1	
AM 0691	Cotton fodder, dry			0.36	0.55	
AF 0645	Maize forage			0.05	0.1	
AL 0528	Pea vines (green)			0.45	0.86	
OC 0495	Rape seed oil, crude			0.08		
OR 0495	Rape seed oil, edible			0.06		
	Rapeseed forage			0.05	0.24	
AV 0596	Sugar beet leaves or tops			1.5	8.3	
JF 0448	Tomato juice			0.015		
CM 0654	Wheat bran, unprocessed			0.084		
CF 1211	Wheat flour			0.015		
	Wheat forage			0.38	1.4	
CF 1210	Wheat germ			0.02		
	Beer			0.0011		
	Canned tomato			0.006		
	Grape pomace			0.032		
	Tomato puree			0.025		
	Wine			0.001		

W: the recommendation is withdrawn

* : at or about the limit of quantification.

[a] Replaced by commodity group MRL

[b] Replaced by olive oil MRLs. Other vegetable oils are covered by the oilseeds MRL.

[c] CCRVDF has established veterinary drug MRLs for cypermethrin and alpha-cypermethrin in cattle muscle (50 µg/kg), cattle liver (50µg/kg), cattle kidney (50 µg/kg) and cattle fat (1000 µg/kg) and the same for sheep muscle (50 µg/kg), sheep liver (50 µg/kg), sheep kidney (50 µg/kg) and sheep fat (1000 µg/kg).

[d] Source of data supporting the proposed MRL: a: alpha-cypermethrin. c: cypermethrin. z: zeta-cypermethrin. Capital letters show the source of data responsible for the MRL estimate. Small letters show the sources of other data for that commodity.

DIETARY RISK ASSESSMENT

Long-term intake

The evaluation of cypermethrin, alpha-cypermethrin and zeta-cypermethrin resulted in recommendations for MRLs and STMR values for raw and processed commodities. Where data on

consumption were available for the listed food commodities, dietary intakes were calculated for the 13 GEMS/Food Consumption Cluster Diets. The results are shown in Annex 3 of the 2008 Report of the JMPR.

The IEDIs in the thirteen Cluster Diets, based on estimated STMRs were 5–20% of the maximum ADI (0.02 mg/kg bw). The Meeting concluded that the long-term intake of residues of the cypermethrins from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The International Estimated Short-term Intake (IESTI) for cypermethrin, alpha-cypermethrin and zeta-cypermethrin was calculated for the food commodities (and their processing fractions) for which maximum residue levels and HRs and STMRs were estimated and for which consumption data were available. The results are shown in Annex 4 of the 2008 Report of the JMPR.

Initially, calculated IESTI values on residues in spinach, head lettuce and leaf lettuce, which are all leafy vegetables, exceeded the ARfD. Sufficient residue data related to an alternative GAP for head lettuce were available where a calculated IESTI did not exceed the ARfD, which allowed the estimation of a maximum residue levels for leafy vegetables that could be recommended as an MRL.

The IESTI varied from 0–40% of the ARfD (0.04 mg/kg bw) for the general population and from 0–90% of the ARfD for children 6 years and below. The Meeting concluded that the short-term intake of residues of the cypermethrins from used considered by the Meeting was unlikely to present a public health concern.

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