

FENBUCONAZOLE (197)

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EXPLANATION

Fenbuconazole, a triazole fungicide, was first evaluated by the JMPR in 1997 as a new compound. At that time the Meeting established an ADI of 0–0.03 mg/kg bw and recommended 26 maximum residue levels adopted by the Codex Alimentarius Commission in 1999 and 2000 as Codex MRLs. The 1997 Meeting concluded that the residue definition for compliance with MRLs and for estimation of dietary intake was fenbuconazole.

The Meeting received information on GAP, storage stability, processing study and residue trial data on citrus (grapefruit, orange and lemon), apple, blueberry, cranberry, plum, peppers, almond and peanut.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The analytical methods for stone fruit, almonds and apples were reported by the 1997 JMPR.

The stone fruit samples were extracted with methanol and partitioned with sodium chloride and dichloromethane. The concentrated sample was purified on silica and Florisil, and analysed by GLC. The recovery was 62–116% at spike level of 0.01–4.0 mg/kg.

Almond hulls were Soxhlet-extracted with methanol, and kernels with toluene/methanol. The analysis was conducted as above, except that clean-up on a C-18 column was included. The recovery was 72–107% for hull and 82–112% at spike level of 0.01–1.0 mg/kg.

The same method, but Soxhlet-extracted with hexane/2-propanol, was used for apple samples. The recovery was 71–114% at fortification level of 0.1–1.0 mg/kg.

Stability of pesticide residues in stored analytical samples

Studies on storage stability of residues fortified with fenbuconazole and the lactone metabolites, reported by the 1997 JMPR, indicated that the residues were stable at -10 °C for 36 months in apples and 54 months in peaches.

A report on the stability of fenbuconazole on almond nutmeat and hulls stored frozen at -15 °C for at least 2.8 years was provided to the Meeting (Stavinski, Burnett and Martin, 1992). Mature samples from residue field trials were originally analysed to provide residue data. Selected nutmeat and hull samples were stored frozen and reanalysed to provide storage stability data for frozen aged field residues. Table 1 summarizes the residue analytical results for almond nutmeat and hull. The residue data for 1035 days of frozen storage show no significant decrease or increase in residue level in either almond matrix.

Table 1 Analytical data of fenbuconazole in almond samples

Matrix	Year of analysis	Almond found (mg/kg)		
Almond nutmeat	1989	NDR	0.028	NDR
	1992	NDR	0.030	NDR
Almond hull	1989	0.95	6.0	NDR
	1992	0.98	5.8	NDR

NDR is no detectable residue at the limit of detection (0.0030 mg/kg). The LOQ is 0.010 mg/kg.

A report on the stability of fenbuconazole on citrus fruit, dried pulp and oil samples was provided to the Meeting (Ross, 1999).

Citrus fruit samples were prepared for use by being frozen and ground. Sixteen of the 25 g samples were fortified with 500 μL of a 15 $\mu\text{g}/\text{mL}$ methanol solution of fenbuconazole and the lactone metabolites (0.3 mg/kg). Eighteen of the 10 g citrus dried pulp samples were spiked with 200 μL of a 15 $\mu\text{g}/\text{mL}$ methanol solution (0.3 mg/kg), and eighteen of the 3 g citrus oil samples were fortified with 600 μL of a 15 $\mu\text{g}/\text{mL}$ methanol solution of fenbuconazole and the lactone metabolites (3.0 mg/kg). All samples were stored in a freezer at ≤ -10 $^{\circ}\text{C}$ for 0 day, 1 month, 4 months, 8 months and 12 months. Table 2 summarized the results obtained with up to 8 months of storage at ≤ -10 $^{\circ}\text{C}$ in fruit and up to 12 months in dried pulp and oil. Table 3 summarized the results obtained with up to 47 months of storage at ≤ -10 $^{\circ}\text{C}$ in dried pulp and oil.

Table 2 Stability of fenbuconazole in citrus samples

Matrix	Storage interval (day)	Fortification level (mg/kg)	Percentage of residue remained (%)	
Fruit	0	0.3	114	104
	33	0.3	102	100
	120	0.3	75.6	74.5
	243	0.3	91.5	101
Dried Pulp	0	0.3	116	118
	33	0.3	78.9	75.1
	146	0.3	101	96.2
	242	0.3	100	91.4
	355	0.3	109	109
Oil	0	3.0	95.8	103
	30	3.0	91.3	108
	119	3.0	101	103
	239	3.0	108	107
	353	3.0	116	125

Table 3 Summary table for reanalysis of fenbuconazole in oil and dried pulp samples at 39 months

Matrix	Fortification level (mg/kg)	Amount found (mg/kg)	Percentage of residue remained (%)
Dried Pulp	0.3	0.316	105
	0.3	0.301	100
	0.3	0.328	109
	0.3	0.312	104
Oil	3.0	2.88	96
	3.0	3.00	100
	3.0	3.04	101
	3.0	3.01	100

A report on storage stability of fenbuconazole in stone fruit (Cherry, Plum and Peach) was submitted to the Meeting (Stavinski *et al.* 1991).

Mature stone fruit samples were pitted, then homogenized with dry ice using a Hobart food processor. The dry ice was allowed to sublime in a freezer. Solution of fenbuconazole were prepared in toluene/methanol (100/3, v/v). To each 25 g subsamples, 100 μL of the fenbuconazole solution were added, resulting in a 1.0 mg/kg concentration in the substrate. At specified time intervals, nominally 0, 7, 14, 28, 60, 90 days, 6 months and 1 year, one set of two samples was analysed. Samples were analysed by the fenbuconazole stone fruit tolerance enforcement method. Samples were stored at -15 $^{\circ}\text{C}$ under the identical conditions that residue samples were stored. The results of the study indicate that residue of fenbuconazole are stable in stone fruit for at least one year when stored at approximately -15 $^{\circ}\text{C}$. Table 4 summarized the results obtained with up one year of storage.

Table 4 Stability of fenbuconazole in stone fruit samples

Matrix	Storage interval (day)	Fortification level (mg/kg)	Percentage of residue remained(%)	
Cherry	0	1.0	93	91
	7	1.0	72	74
	14	1.0	88	83
	28	1.0	72	77
	61	1.0	79	77
	91	1.0	72	74
	180	1.0	78	74
	392	1.0	94	94
Plum	0	1.0	88	86
	7	1.0	76	71
	14	1.0	86	82
	28	1.0	73	79
	59	1.0	71	72
	90	1.0	72	78
	182	1.0	72	74
	378	1.0	92	99
Peach	0	1.0	89	96
	6	1.0	75	88
	13	1.0	74	79
	27	1.0	68	72
	59	1.0	76	72
	89	1.0	66	68
	180	1.0	74	76
	381	1.0	85	83

USE PATTERN

Fenbuconazole is commonly applied as a foliar treatment and is currently registered for use on a range of fruits and vegetables. The Meeting received additional and modified labels in many countries in Europe, North America, Latin America, Asia and Australia.

Information of registered formulations, application methods and dosage rate of fenbuconazole for uses on the crops is summarized in Table 5.

Table 5 Registered uses of fenbuconazole relevant to the review

Crop	Country	Formulation		Application of fenbuconazole					PHI days
		Type	Conc. of fenbuconazole (conc. of other ingredient)	Method	Rate kg ai/ha	Volume L/ha	Spray conc. kg ai/hl	Number max	
Citrus	USA	SC	235 g/kg	Foliar Aerial	0.135	187 93	0.072 0.145	3	0
Citrus	USA	WSP	750 g/kg	Foliar Aerial	0.140	187 93	0.074 0.151	3	0
Apple	Argentina		240 g/L	Foliar			0.002- 0.004	2	30
Apple	Chile	SC	240 g/L	Foliar			0.0029- 0.0034	4	30
Apple	Croatia	EW	50 g/L	Foliar			0.003	4	28
Apple	France	EW	50 g/L	Foliar	0.035- 0.053	1000- 1500	0.0035	3	28

Fenbuconazole

Crop	Country	Formulation		Application of fenbuconazole					PHI days
		Type	Conc. of fenbuconazole (conc. of other ingredient)	Method	Rate kg ai/ha	Volume L/ha	Spray conc. kg ai/hl	Number max	
Apple	Greece	EW	50 g/L	Foliar	0.03-0.06	1000-2000	0.003	4	28
Apple	Indonesia	SC	246 g/L	Foliar	0.03-0.06	500	0.006-0.012	NS ^a	14
Apple	Israel	EC	50 g/L	Foliar		Till run-off	0.002	3-5	14
Apple	Israel		50 g/L (160 g/L dinocap)	Foliar			0.002	NS	21
Apple	Italy	EW	50 g/L	Foliar	>0.045		0.003-0.004	4	28
Apple	Japan	SC	220 g/L	Foliar	0.04-0.28	2000-7000	0.002-0.004	3	14
Apple	Japan	WP	22 g/kg (625 g/L mancozeb)	Foliar	0.08-0.28	2000-7000	0.004	3	60
Apple	Jordan	EC	50 g/L	Foliar			0.06-0.07	NS	7
Apple	Korea	WP	120 g/kg	Foliar			0.006	5	7
Apple	Korea	WS	60 g/L	Foliar			0.006	5	14
Apple	Macedonia	EW	50 g/L	Foliar	0.045-0.05	900-1667	0.003-0.005	NS	28
Apple	Poland	EW	50 g/L	Foliar	0.035	500-750	0.005-0.007	3	28
Apple	Portugal	EW	50 g/L	Foliar			0.004	NS	28
Apple	Slovenia	EW	50 g/L	Foliar	0.045	1500	0.003	NS	21
Apple	South Africa	EW	50 g/L	Foliar			0.002	4	14
Apple	Spain	EW	50 g/L	Foliar	0.05	1000-1429	0.0035-0.005	4	28
Apple	Turkey	EC	50 g/L	Foliar			0.002	NS	14
Apple	UK	EW	50 g/L	Foliar	0.07	200-2000	0.0035-0.035	10	28
Apple	USA	SC	235 g/kg	Foliar Aerial	0.105-0.13	187 93	0.06-0.07 0.12-0.14	4	14
Apple	USA	WSP	750 g/kg	Foliar Aerial	0.105-0.140	187 93	0.06-0.07 0.11-0.15	4	14
Pear	Chile	SC	240 g/L	Foliar			0.0029-0.0034	4	30
Pear	France	EW	50 g/L	Foliar	0.035-0.053	1000-1500	0.0035	3	28
Pear	Israel	EC	50 g/L	Foliar		Till run-off	0.002	3-5	14
Pear	Italy	EW	50 g/L	Foliar	>0.038		0.0025	NS	28
Pear	Japan	SC	220 g/L	Foliar	0.04-0.28	2000-7000	0.002-0.004	3	7
Pear	Japan	WP	22 g/kg (625 g/L mancozeb)	Foliar	0.08-0.28	2000-7000	0.004	3	45
Pear	Jordan	EC	50 g/L	Foliar			0.06-0.07	NS	7
Pear	Korea	WP	120 g/kg	Foliar			0.006	4	14
Pear	Korea	WS	60 g/L	Foliar			0.006	4	14
Pear	Portugal	EW	50 g/L	Foliar			0.004	NS	28
Pear	South Africa	EW	50 g/L	Foliar			0.002	4	14

Crop	Country	Formulation		Application of fenbuconazole					PHI days
		Type	Conc. of fenbuconazole (conc. of other ingredient)	Method	Rate kg ai/ha	Volume L/ha	Spray conc. kg ai/hl	Number max	
Pear	Spain	EW	50 g/L	Foliar	0.05	1000-1429	0.0035-0.005	4	28
Pear	UK	EW	50 g/L	Foliar	0.07	200-2000	0.0035-0.035	10	28
Plum and Prune	Canada	WSP	750 g/kg	Foliar	0.105	>500	>0.021	7	1
Plum	Chile	SC	240 g/L	Foliar			0.0048-0.018	4	7
Plum	France	EW	50 g/L	Foliar	0.05-0.075	1000-1500	0.005	5	3
Plum	Israel	EC	50 g/L	Foliar		Till run-off	0.002	3-5	14
Plum	Israel		50 g/L (160 g/L dinocap)	Foliar			0.002	NS	14
Plum	Italy	EW	50 g/L	Foliar			0.0035-0.005	2-3	3
Plum	Japan	SC	220 g/L	Foliar	0.088-0.308	2000-7000	0.0044	2	1
Prune	Japan	SC	220 g/L	Foliar	0.088-0.308	2000-7000	0.0044	4	1
Plum	Jordan	EC	50 g/L	Foliar			0.07-0.10	NS	7
Plum	Macedonia	EW	50 g/L	Foliar	0.05	1000	0.005	NS	3
Plum	South Africa	EW	50 g/L	Foliar			0.004	4	1
Plum	South Korea	WP	120 g/kg	Foliar			0.006	5	7
Plum and Prune	USA	SC	235 g/kg	Foliar Aerial	0.105	187 93	0.056 0.11	4	0
Plum and Prune	USA	WSP	750 g/kg	Foliar Aerial	0.105	187 47	0.056 0.22	4	0
Blueberry	USA	SC	235 g/kg	Foliar Aerial	0.105	187 93	0.056 0.11	4	30
Blueberry	USA	WSP	750 g/kg	Foliar Aerial	0.105-0.140	187 93	0.06-0.07 0.11-0.15	4	30
Cranberry	Chile	SC	240 g/L	Foliar			0.018-0.024	4	7
Cranberry	Chile	SC	240 g/L	Foliar			0.024-0.03	4	20
Cranberry	USA	SC	235 g/kg	Foliar Aerial	0.105-0.211	187 47	0.06-0.11 0.22-0.44	4	30
Cranberry	USA	WSP	750 g/kg	Foliar Aerial	0.105-0.211	187 47	0.06-0.11 0.22-0.44	4	30
Pepper, chilli	Indonesia	SC	246 g/L	Foliar	0.06-0.12	500	0.012-0.025	NS	14
Pepper	Israel	EC	50 g/L	Foliar	0.05	300-500	0.01-0.017	3-5	3
Pepper	USA	WSP	750 g/kg	Foliar Aerial	0.105-0.211			4	7
Almond	Chile	SC	240 g/L	Foliar			0.0048-0.018	4	7
Almond	Israel	EC	50 g/L	Foliar		Till run-off	0.002 0.004	3-5	14
Almond	USA	SC	235 g/kg	Foliar Aerial	0.067-0.105	187 93	0.04-0.06 0.07-0.11	3	160

Crop	Country	Formulation		Application of fenbuconazole					PHI days
		Type	Conc. of fenbuconazole (conc. of other ingredient)	Method	Rate kg ai/ha	Volume L/ha	Spray conc. kg ai/hl	Number max	
Almond	USA	WSP	750 g/kg	Foliar Aerial	0.067- 0.105	187 93	0.04-0.06 0.07-0.11	3	160
Peanut	Argentina		240 g/L	Foliar	0.144	500- 1000	0.014- 0.029	NS	15
Peanut	USA	SC	235 g/kg	Foliar Aerial	0.069- 0.135	187 47	0.04-0.07 0.15-0.29	4	14
Peanut	USA	WSP	750 g/kg	Foliar Aerial	0.069- 0.140	187 47	0.04-0.07 0.15-0.30	4	14

NS = Not specified on the label

RESIDUES RESULTING FROM SUPERVISED TRIALS

Relevant data from supervised trials on apples and pears, evaluated by the 1997 JMPR, are interpreted in the light of current GAP and the Meeting received new information on supervised field trials for the following crops.

Commodity	Group	Table No
Grapefruit	Citrus	Table 6
Oranges		Table 7
Lemon		Table 8
Apples	Pome fruits	Table 9–11
Pears		Table 12
Plum	Stone fruits	Table 13
Blueberry	Berries and other small fruits	Table 14
Cranberry		Table 15
Peppers	Fruiting vegetables, other than cucurbits	Table 16
Almonds	Tree nuts	Table 17
Peanut	Oilseed	Table 18

Each formulation of fenbuconazole, used in these trials, was applied for foliar spray. Each of the field trial sites generally consisted of untreated control plot and treated plot.

When residues were not detected they are shown as below the LOQ. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels and STMRs. Those results included in the evaluation are double underlined.

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. Residue data are not corrected for percent recovery.

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

Citrus

Results from supervised trials on grapefruit in USA were provided to the 1997 JMPR. Data from these trials are summarized in Table 6.

Table 6 Fenbuconazole residues on grapefruit from supervised trials in USA

Grapefruit country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, USA</i>	<i>SC</i>	<i>0.135</i>	<i>0.072</i>	<i>187</i>	<i>3</i>	<i>0</i>		
USA/TX, 1992 (Rio Red)	EC	0.280			3	0	0.190	Batra and Cressman, 1996, RAR 93-0002
USA/FL, 1992 (Marsh)	EC	0.280			3	0 15 26 59	0.487 0.318 0.319 0.126	Batra and Cressman, 1996, RAR 93-0003
USA/CA, 1993 (Oro Gold)	EC	0.280			3	0	0.342	Batra and Cressman, 1996, RAR 93-0008
USA/TX, 1993	SC	0.280	0.029		3	0	0.162 < 0.01 (pulp)	Batra, 1996
USA/TX, 1993	SC	0.280	0.03		3	0	0.123 < 0.01 (pulp)	Batra, 1996
USA/CA, 1994	SC	0.280	0.015		3	0	0.134 0.0199 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.015		3	0	0.0976 < 0.01 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.013		3	0	0.155 0.464 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.028		3	0	0.157 < 0.01 (pulp)	Batra, 1996

Results from supervised trials on oranges in USA were provided to the 1997 JMPR. Data from these trials are summarized in Table 7.

The Meeting received seven trials on oranges which were conducted in USA (Florida and California) using a SC formulation containing 243 g/L fenbuconazole.

The analytical method was validated with analyses of spiked control samples with fenbuconazole at fortification levels ranging from 0.01 to 1 mg/kg. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 7 Fenbuconazole residues on oranges from supervised trials in USA

Oranges country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, USA</i>	<i>SC</i>	<i>0.135</i>	<i>0.072</i>	<i>187</i>	<i>3</i>	<i>0</i>		
USA/TX, 1992 (Everhard Navel)	EC	0.280			3	0 15 30 60	0.518 0.303 0.450 0.272	Batra and Cressman, 1996, RAR 93-0001
USA/FL, 1992 (Valencia)	EC	0.280			3	0 15 26 59	0.442 0.259 0.348 0.184	Batra and Cressman, 1996, RAR 93-0004

Oranges country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
USA/CA, 1993 (Lane Navel)	EC	0.280			3	0	0.339	Batra and Cressman, 1996, RAR 93-0007
USA/TX, 1993	SC	0.280	0.029		3	0	0.178 < 0.01 (pulp)	Batra, 1996
USA/TX, 1993	SC	0.280	0.03		3	0	0.176 < 0.01 (pulp)	Batra, 1996
USA/CA, 1994	SC	0.280	0.015		3	0	0.304 < 0.01 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.020		3	0	0.19 < 0.01 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.028		3	0	0.279 0.0104 (pulp)	Batra, 1996
USA/FL, 1994	SC	0.280	0.017		3	0	0.187	Batra, 1996
USA/FL, 1997 (Navel)	SC	0.280		698-716	3	0	0.166, 0.166	Ross, 1998 RAR 97-0109
USA/FL, 1997 (Hamlin)	SC	0.280		1161-1183	3	0	0.133, 0.160	Ross, 1998 RAR 97-0120
USA/FL, 1997 (Hamlin)	SC	0.280		1420-1452	3	0	0.576, 0.742	Ross, 1998 RAR 97-0121
USA/FL, 1997 (Hamlin)	SC	0.280		771-829	3	0	0.160, 0.179	Ross, 1998 RAR 97-0122
USA/FL, 1997 (Hamlin)	SC	0.280		730-758	3	0	0.222, 0.378	Ross, 1998 RAR 97-0124
USA/FL, 1997 (Pineapple)	SC	0.280		714-740	3	0	0.100, 0.139	Ross, 1998 RAR 97-0125
USA/CA, 1997 (Washington Navel)	SC	0.280		1782-1890	3	0	0.105, 0.145	Ross, 1998 RAR 97-0126

The Meeting received five trials on lemon which were conducted in USA (Florida and California) using a SC formulation containing 254 g/L fenbuconazole.

The analytical method was validated with analyses of spiked control samples with fenbuconazole at fortification levels ranging from 0.01 to 1.0 mg/kg. The limit of quantification (LOQ) was 0.010 mg/kg.

Table 8 Fenbuconazole residues on lemon from supervised trials in USA

Lemon country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, USA</i>	SC	<i>0.135</i>	<i>0.072</i>	<i>187</i>	<i>3</i>	<i>0</i>		
USA/FL, 2000 (Asiatic)	SC	0.280		1121	3	0	0.525, 0.642 0.0654 (peeled)	Ross, 2001 RAR 00-0011
USA/CA, 2000 (Prior)	SC	0.280		1401	3	0	0.592, 1.07 0.016 (peeled)	Ross, 2001 RAR 00-0012
USA/CA, 2000 (Lisbon)	SC	0.280		1541	3	0	0.456, 0.703 0.170 (peeled)	Ross, 2001 RAR 00-0013
USA/CA, 2000 (Lisbon)	SC	0.280		560	3	0	0.364, 0.668 0.0319 (peeled)	Ross, 2001 RAR 00-0014
USA/CA, 2000 (Lisbon)	SC	0.280		560	3	0	0.616, 0.790 0.035 (peeled)	Ross, 2001 RAR 00-0015

Apples

Results from supervised trials on apples in France, Greece, Italy and UK were provided to the 1997 JMPR. Data from these trials are interpreted in the light of current GAP in Table 9.

Table 9 Residue interpreted table for fenbuconazole residues on apples from supervised trials in Europe

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, France</i>	<i>EW</i>	<i>0.04- 0.05</i>	<i>0.0035</i>	<i>1000-1500</i>	<i>3</i>	28		
<i>GAP, Spain</i>	<i>EW</i>	<i>0.05</i>	<i>0.0035- 0.005</i>	<i>1000-1429</i>	<i>4</i>	28		
South France, 1992	EW	0.04			9	33	0.03	Rhone-Poulenc 1993
South France, 1992	EW	0.03			9	20	0.04	Rhone-Poulenc 1993
South France, 1989	EW	0.05 0.07			8	27 27	<u>< 0.02</u> < 0.02	Journet, 1990
South France, 1993	EW	0.05			6	0 21	0.07 <u>0.03</u>	Herrise, 1994
South France, 1993	EW	0.05			4	28	<u>0.03</u>	Herrise, 1994
South France, 1993	EW	0.05			6	0 21	0.09 <u>0.05</u>	Herrise, 1994
South France, 1993	EW	0.05			10	0 21	0.07 <u>0.04</u>	Herrise, 1994
South France, 1993	EW	0.05			4	0 21	0.03 <u>0.03</u>	Herrise, 1994
South France, 1993	EW	0.05			4	0 21	0.05 <u>0.02</u>	Herrise, 1994
Greece, 1993	EW	0.03	0.003		4	0 7 14 21 28 35	0.04 0.02 < 0.01 0.03 < 0.01 < 0.01	Huntingdon, 1994
Italy, 1990	EC	(0.08)	0.003		12	0 4 7 14 21 28	0.06 0.05 0.02 0.03 < 0.005 < 0.005	Pessina, 1991
		(0.16)	0.006		12	30 21 30	< 0.005 < 0.005 < 0.005	
Italy, 1991	EW	0.06	0.003		11	21 28 43	0.05 <u>0.03</u> 0.01	Pessina, 1992
		0.12	0.006		11	21 28 43	0.03 0.05 0.02	
Italy, 1994	EW	0.049	0.003		6	0 28	0.07 <u>0.02</u>	Pessina, 1995
		0.095	0.006		6	0 28	0.14 0.02	
Italy, 1995	EW	0.046	0.003		6	0 28	0.07 <u>0.01</u>	Pessina, 1995
		0.093	0.006		6	0	0.14	

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
						28	0.03	
<i>GAP, UK</i>	<i>EW</i>	<i>0.07</i>	<i>0.0035- 0.035</i>	<i>200-2000</i>	<i>10</i>	28		
North France, 1992	EW	0.04			4	0 7 14 29 41	0.09 0.03 0.04 < 0.02 0.02	Anadiag, 1993
North France, 1993	EW	0.035 0.05			2 2	0 21 0 21	0.20 0.17 0.26 0.28	Roussel, 1994
UK, 1990	EW	0.068	0.0034		10	0 3 5 14	0.15 0.07 0.09 0.07	Murray, 1991
UK, 1991	EW	0.068	0.0034		9	0 28	0.13 <u>0.03</u>	Murray, 1992
UK, 1991	EW	0.068	0.0034		9	0 28	0.12 <u>0.02</u>	Murray, 1992
UK, 1991	EW	0.068	0.0034		9	0 28	0.10 <u>0.04</u>	Murray, 1992
UK, 1991	EW	0.068	0.0034		9	0 28	0.18 <u>0.04</u>	Murray, 1992
UK, 1991	EW	0.068 0.136	0.0034 0.0068		10 10	0 7 14 21 28 28	0.27 0.15 0.18 0.07 <u>0.06</u> 0.12	Murray, 1992
UK, 1991	EW	0.068	0.0034		11	0 7 14 21 28	0.09 0.09 0.06 0.05 <u>0.02</u>	Murray, 1992
UK, 1992	EW	0.068	0.0034		10	0 28	0.12 <u>0.05</u>	Murray, 1994
UK, 1992	EW	0.068	0.0034		10	0 28	0.13 <u>0.03</u>	Murray, 1994
UK, 1992	EW	0.068 0.132	0.0034 0.0068		11	0 28 0 28	0.09 <u>0.02</u> 0.14 0.04	Murray, 1994
UK, 1992	EW	0.068 0.132	0.0034 0.0068		10	0 28 0 28	0.05 <u>0.03</u> 0.06 0.01	Murray, 1994

The Meeting received new residue trials on apples. A total of twelve field trials were conducted in Europe, including the Northern and Southern European zones. Eight trials on apple were conducted in Southern France and Spain in 2004 and 2006, four trials in Northern France, UK and Germany in 2006. All eight trials conducted in Southern France and Spain received four applications at 8–12 day intervals of the EW formulation containing 50 g/L fenbuconazole at a rate of 0.0035 kg g ai/L. The pesticides were diluted with water immediately prior to application and applied at 1500 L/ha (0.053 kg ai/ha). The total amount of fenbuconazole applied was 0.21 kg ai/ha. The four

Northern France, UK and Germany trials received four applications at 10–13 day intervals of the EW formulation containing 50 g/L fenbuconazole at a rate of 0.070 kg ai/ha (500 L/ha). The total amount of fenbuconazole applied was 0.28 kg ai/ha.

The analytical method was validated with analyses by spiking control samples with fenbuconazole at fortification levels ranging from 0.01 to 0.5 mg/kg. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 10 Fenbuconazole residues in apple from supervised trials in Europe

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, France</i>	<i>EW</i>	<i>0.04- 0.05</i>	<i>0.0035</i>	<i>1000-1500</i>	<i>3</i>	28		
<i>GAP, Spain</i>	<i>EW</i>	<i>0.05</i>	<i>0.0035- 0.005</i>	<i>1000-1429</i>	<i>4</i>	28		
South France, 2004 (Starkinson)	EW	0.05	0.0035	1410-1563	4	-0 0 7 14 28 35	0.20 0.27 0.26 0.10 <u>0.17</u> 0.15	Stevenson, 2005 AF/7782/DE/3
South France, 2004 (Granny)	EW	0.05	0.0035	1429-1571	4	26 36 44 55	<u>0.18</u> 0.11 0.12 0.12	Stevenson, 2005 AF/7782/DE/4
South France, 2006 (Golden Delicious)	EW	0.05	0.0035	1488-1535	4	28	<u>0.04</u>	Balluf, 2007 F06W055R
South France, 2006 (Golden Delicious)	EW	0.05	0.0035	1500-1517	4	-0 0 7 14 28 35	0.06 0.08 0.10 0.07 <u>0.06</u> 0.03	Balluf, 2007 F06W056R
Spain, 2004 (Golden)	EW	0.05	0.0035	1483-1533	4	-0 0 7 14 28 35	0.27 0.44 0.24 0.25 <u>0.33</u> 0.19	Stevenson, 2005 AF/7782/DE/1
Spain, 2004 (Golden)	EW	0.05	0.0035	1399-1546	4	26 36 48 56	<u>0.16</u> 0.15 0.08 0.09	Stevenson, 2005 AF/7782/DE/2
Spain, 2006 (Topo Rojo)	EW	0.05	0.0035	1391-1544	4	28	<u>0.06</u>	Balluf, 2007 S06W037R
Spain, 2006 (Royal Gala)	EW	0.05	0.0035	1502-1510	4	-0 0 7 14 28 35	0.06 0.12 0.09 0.06 <u>0.04</u> 0.02	Balluf, 2007 S06W038R
<i>GAP, UK</i>	<i>EW</i>	<i>0.07</i>	<i>0.0035- 0.035</i>	<i>200-2000</i>	<i>10</i>	28		
North France, 2006 (Elstar)	EW	0.07	0.014	504-515	4	-0 0 7 14	0.07 0.11 0.05 0.03	Balluf, 2007 F06W057R

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
						28 35	<u>0.03</u> 0.02	
Germany, 2006 (Elstar)	EW	0.07- 0.08	0.014	505-560	4	28	<u>0.05</u>	Balluf, 2007 G06W030R
Germany, 2006 (Cox Orange)	EW	0.07	0.014	481-517	4	-0 0 7 14 28 35	0.05 0.12 0.07 0.04 <u>0.04</u> 0.05	Balluf, 2007 G06W031R
UK, 2006 (Bramley)	EW	0.07	0.014	492-534	4	28	<u>0.06</u>	Balluf, 2007 GB06W006R

Results from supervised trials on apples in USA were provided to the 1997 JMPR. Data from these trials are interpreted in the light of current GAP in Table 8.

The Meeting received sixteen trials on apple, which were conducted in USA in California, Colorado, Michigan, New York, Ohio, Oregon, Washington and Pennsylvania. Fourteen trials conducted in CA, CO, MI, NY, OH, OR and WA received eight to ten applications of the SC formulation containing 243 g/L fenbuconazole at a rate of 0.14 kg ai/ha in dilute (14001900 L/ha) and concentrate sprays (370450 L/ha). One trial conducted in PA received nine foliar applications of the EC formulation containing 236 g/L fenbuconazole at a rate of 0.14 kg ai/ha (467 L/ha). At one trial conducted in WA apples were treated eight times with the EC formulation containing 235 g/L fenbuconazole at 0.28 kg ai/ha. The total seasonal rate was 1.12 kg ai/ha to 1.40 kg ai/ha, depending on the number of applications. The first application was made at early bud break. Subsequent applications were on a 10 to 14 day schedule through bloom and a 14 to 21 day schedule until apples were ready to be harvested.

The analytical method was validated with analyses by spiking control samples with fenbuconazole at fortification levels ranging from 0.01 to 1.0 mg/kg. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 11 Fenbuconazole residues in apple from supervised trials in USA

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, USA</i>	SC	<i>0.105</i> <i>-0.13</i>	<i>0.06-</i> <i>0.07</i>	<i>187</i>	<i>4</i>	<i>14</i>		
USA/WA,1990 (Red Delicious)	EC	0.28			8	0	0.203	Burnet and Martin, 1992 RAR 90-0146
USA/ PA, 1994 (Red Delicious)	EC	0.14	0.035	467	9	14	<u>0.061</u> (unwashed) 0.066 (washed)	Batra, 1995, RAR 94-0123
USA/OH, 1995 (McIntosh)	SC	0.14	0.035 0.014	403 992	8	14	0.012 <u>0.016</u>	Batra and Cressman, 1996, RAR 95-0117
USA/NY, 1995 (McIntosh)	SC	0.14	0.038 0.01	373 1400	10	14	<u>0.074</u> 0.053	Batra and Cressman, 1996, RAR 95-0150

Apples country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
USA/WA, 1995 (Red Delicious)	SC	0.14	0.038 0.01	373 1400	8	14	<u>0.197</u> 0.129	Batra and Cressman, 1996, RAR 95-0153
USA/CA, 1995 (Granny Smith)	SC	0.14	0.033 0.01	420 1400	8	14	0.273 <u>0.283</u>	Batra and Cressman, 1996, RAR 95-0161
USA/MI, 1995 (Golden Delicious, Smoothie)	SC	0.14	0.032 0.014	439 1008	9	14	0.159 <u>0.179</u>	Batra and Cressman, 1996, RAR 95-0171
USA/OR, 1995 (Red Delicious)	SC	0.14	0.037 0.01	377 1409	10	14	0.122 <u>0.171</u>	Batra and Cressman, 1996, RAR 95-0198
USA/CO, 1995 (Golden Delicious)	SC	0.14	0.033 0.008	420 1867	9	14	<u>0.089</u> 0.086	Batra and Cressman, 1996, RAR 95-0253
USA/MI, 1990	SC	0.14	0.0106		10	0 7 13	0.244 0.126 <u>0.059</u>	Burnett, 1992
		0.28	0.0211		10	13	0.142	
USA/NC, 1990	SC	0.14	0.016		8	0 7 14	0.018 0.043 <u>0.123</u>	Burnett, 1992
USA/PA, 1990	SC	0.14	0.0032		9	0 7 14	0.165 0.076 <u>0.052</u>	Burnett, 1992
USA/VA, 1990	SC	0.14	0.015		8	0 7 14	0.154 0.085 <u>0.080</u>	Burnett, 1992
		0.28	0.03		8	14	0.159	
USA/WA, 1990	SC	0.14	0.0035		8	0 7 14	0.166, 0.142 0.140, 0.065 <u>0.119</u> , 0.038	Burnett, 1992
		0.28	0.0067		8	14	0.093	
USA/WV, 1990	SC	0.14	0.0143		8	0 7 14	0.164 0.128 <u>0.129</u>	Burnett, 1992
USA/PA, 1993	SC WP	0.14 0.14	0.015 0.015		11 11	14 14	0.116 <u>0.145</u>	Batra, 1994
USA/WA, 1993	SC WP	0.14 0.14	0.015 0.015		10 10	14 14	<u>0.200</u> 0.161	Batra, 1994

Pears

Results from supervised trials on pears in Italy, Spain and South Africa were provided to the 1997 JMPR. Data from these trials are interpreted in the light of current GAP in Table 12.

Table 12 Residue interpreted table for fenbuconazole residues on pears

Pears country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, France</i>	<i>EW</i>	<i>0.035- 0.053</i>	<i>0.0035</i>	<i>1000-1500</i>	<i>3</i>	28		
<i>GAP, Italy</i>	<i>EW</i>	<i>>0.038</i>	<i>0.0025</i>			28		
<i>GAP, Spain</i>	<i>EW</i>	<i>0.05</i>	<i>0.0035- 0.005</i>	<i>1000-1429</i>	<i>4</i>	28		
Italy, 1990	EC	0.10	0.003		6	14 21	0.02 0.02	Pessina, 1991
		0.20	0.006		6	14 21	0.05 0.02	
Italy, 1991	EW	0.06	0.003		6	28 42	0.01 0.02	Pessina, 1992
		0.12	0.006		5	28 42	0.03 0.03	
Spain, 1992	SE	0.037 0.056			4	36 36	0.034 0.057	Anadiag, 1993
South Africa, 1994	EW		0.004		1	0 14 28	0.13 0.08 0.04	Applefarth, 1995

See JMPR 1997 Report

Plums

A total of thirteen supervised trials on plums were conducted in Northern Europe and USA. Eight trials on plums were conducted in Germany and North France using an EC formulation containing 50 g/L fenbuconazole. One trial in North France was conducted using an EW formulation containing 50 g/L. Four trials in USA were conducted using a SC formulation containing 228 g/L.

The analytical method was validated with analyses by spiking control samples with fenbuconazole. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 13 Fenbuconazole residues in plums from supervised trials in Northern Europe and USA

Plums country, year (variety)	Application					PHI Days	Residues ^a , mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, France</i>	<i>EW</i>	<i>0.05- 0.075</i>	<i>0.005</i>	<i>1000-1500</i>	<i>5</i>	3		
Germany, 1997 (Ortenauer)	EC	0.11	0.0075	1475-1517	5	0 3 7	0.28 0.20 0.07	Lees, 1998, RAS/13/1/G
Germany, 1997 (Hauszwetsche)	EC	0.11- 0.12	0.0225	501-522	5	0 3 7	0.66 0.47 0.45	Lees, 1998, RAS/13/2/G
Germany, 1997 (Ortenauer)	EC	0.11	0.0075	1497-1509	5	0 3 7	0.14 0.06 0.06	Lees, 1998, RAS/13/3/G
Germany, 1997 (Buhler)	EC	0.11- 0.12	0.0225	476-515	5	0 3 7	0.31 0.27 0.12	Lees, 1998, RAS/13/4/G

Plums country, year (variety)	Application					PHI Days	Residues ^a , mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
North France, 1998 (Quetsche)	EC	0.05- 0.08	0.005	1097-1587	5	0 3 7	0.04 0.03 <u>0.04</u>	Gilbert, 1999, AF/4288/HL/1
		0.08- 0.12	0.0075	1078-1543	5	0 3 7	0.09 0.13 0.08	
North France, 1998 (Quetsche)	EC	0.06- 0.08	0.005	1188-1538	5	0 3 7	0.08 <u>0.08</u> 0.08	Gilbert, 1999, AF/4288/HL/2
		0.09- 0.11	0.0075	1155-1520	5	0 3 7	0.10 0.07 0.05	
North France, 1998 (Stanley)	EC	0.07- 0.09	0.005	1375-1722	5	0 3 7	0.11 <u>0.10</u> 0.07	Gilbert, 1999, AF/4288/HL/3
		0.11- 0.13	0.0075	1422-1667	5	0 3 7	0.17 0.16 0.16	
North France, 1998 (Quetsche)	EC	0.06- 0.08	0.005	1221-1539	5	0 3 7	0.08 <u>0.06</u> 0.05	Gilbert, 1999, AF/4288/HL/4
		0.09- 0.12	0.0075	1219-1542	5	0 3 7	0.12 0.11 0.10	
North France, 2006 (Quetsches d'Alsace)	EW	0.072- 0.077	0.005	1440-1531	5	3	<u>0.17</u>	Balluf, 2007, F06W060R
<i>GAP, USA</i>	<i>SC</i>	<i>0.105</i>	<i>0.056</i>	<i>187</i>	<i>4</i>	<i>0</i>		
USA/CA, 1987 (El Dorado)	SC	0.112		2929	9	6 14	0.035, 0.036, 0.124 0.010, 0.012, 0.020	Martin et al, 1988, RAR 87-0206
USA/WA, 1987 (Ear. Italian)	SC	0.112		1513	8	7	< 0.010, < 0.010, < 0.010	Martin et al, 1988, RAR 87-0258
USA/CA, 1987 (Red Butte)	SC	0.112		2929	7	9 14	0.014, 0.024, 0.032 0.007, 0.007, 0.009	Martin et al, 1988, RAR 87-0163
USA/CA, 1987 (Santa Rosa)	SC	0.112		2929	8	7 14	0.022, 0.048, 0.057 0.041, 0.044, 0.107	Martin et al, 1988, RAR 87-0204

^a Flesh was analysed and results were corrected for the weight of stones except for the results in USA which were not specified.

Blueberries

A total of ten supervised trials on blueberries were conducted in USA in Georgia, Michigan, New Hampshire, North Carolina, Oregon and New Jersey. Indar 75W (WP formulation containing 750 g/L fenbuconazole) was applied for foliar spray.

The analytical method was validated with analyses by spiking control samples with fenbuconazole at fortification levels ranging from 0.01 to 1.0 mg/kg. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 14 Fenbuconazole residues in blueberries from supervised trials in USA

Blueberries country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ ha	kg g ai/L	water, L/ha	no.			
GAP, USA	SC	0.105			4	30		
	WP	0.105- 0.140			4	30		
USA/GA, 1996 (Georgia Gem)	WP	0.105			5	27	0.03, <u>0.03</u>	Thompson, 1998, 96-GA*13 ^a
USA/MI, 1996 (Jersey)	WP	0.105			5	30	0.06, <u>0.07</u>	Thompson, 1998, 96-MI13
USA/MI, 1996 (Jersey)	WP	0.105			5	30	0.03, <u>0.03</u>	Thompson, 1998, 96-MI14
USA/MI, 1996 (Jersey)	WP	0.105			5	30	< 0.01, <u>0.01</u>	Thompson, 1998, 96-MI15
USA/NH, 1996 (Blue Ray)	WP	0.105			5	25	0.10, <u>0.20</u>	Thompson, 1998, 96-NH04
USA/NC, 1996 (Croatan)	WP	0.105			5	27	0.05, <u>0.06</u>	Thompson, 1998, 96-NC11
USA/OR, 1996 (Bluecrop)	WP	0.105			5	35	0.08, <u>0.10</u>	Thompson, 1998, 96-OR20
USA/NJ, 1997 (Duke)	WP	0.053			5	25	0.03, 0.04	Thompson, 1998, 97-NJ36
USA/MI, 1998 (Jersey)	WSP	0.105- 0.108			5	30	0.06, <u>0.07</u>	Thompson, 2000, 98-MI16
USA/MI, 1998 (Jersey)	WSP	0.105- 0.106			5	30	0.06, <u>0.06</u>	Thompson, 2000, 98-MI17

^a A cold period occurred just after third application during early bloom and most of blossoms were lost. The fourth application was applied to additional flower buds that bloomed

Cranberries

Five supervised field trials were conducted in USA in Massachusetts, New Jersey, Wisconsin and Oregon using Indar 75 WP (WP formulation containing 750 g/L fenbuconazole). At each trial, five broadcast foliar applications of the test substance were made to each treated plot at the rate of approximately 0.210 kg ai/ha.

The analytical method was validated with analyses by spiking control samples with fenbuconazole at fortification levels ranging from 0.01 to 2.0 mg/kg. The limit of quantification (LOQ) was 0.01 mg/kg.

Table 15 Fenbuconazole residues in cranberries from supervised trials in USA

Cranberries country, year (variety)	Application					PHI Days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	No.			
<i>GAP, USA</i>	<i>WSP</i>	<i>0.105- 0.211</i>		<i>187</i>	<i>4</i>	<i>30</i>		
USA/MA, 1998 (Howes)	WP	0.208		2765-2802	5	28	0.07, <u>0.09</u>	Thompson, 2000,, 98-MA01
USA/NJ, 1998 (Early Black)	WP	0.210		355-448	5	25	0.07, <u>0.09</u>	Thompson, 2000, 98-NJ11
USA/OR, 1998 (Stevens)	WP	0.208		280-458	5	27	0.37, <u>0.45</u>	Thompson, 2000, 98-OR12
USA/WI, 1998 (Ben Lear)	WP	0.210		280-290	5	28	0.12, <u>0.13</u>	Thompson, 2000, 98-WI08
USA/WI, 1998 (Ben Lear)	WP	0.210		280-290	5	28	0.13, <u>0.15</u>	Thompson, 2000, 98-WI09

Peppers

Nine supervised trials on peppers were conducted in USA. Bell peppers were grown in Maryland, Georgia, Florida, Texas, Ohio and California. Non-bell peppers were grown in Texas, Florida and California. In each trial, at least four foliar applications of Indar 75WP (WP formulation containing 750 g/L fenbuconazole) at a rate of 0.187 kg ai/ha each were made for a total of approximately 0.749 kg ai/ha. In Georgia and Florida, five applications were made to allow the peppers to mature. A total of approximately 0.936 kg ai/ha was applied in these trials.

The analytical method was validated with analyses by spiking control samples with fenbuconazole at fortification levels ranging from 0.01 to 1.0 mg/kg. The limit of quantification (LOQ) was 0.008 mg/kg.

Table 16 Fenbuconazole residues in peppers from supervised trials in USA

Peppers country, year (variety)	Application					PHI Days	Residues, mg/kg ^a	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
<i>GAP, USA</i>	<i>WP</i>	<i>0.105- 0.211</i>			<i>4</i>	<i>7</i>		
Bell pepper								
USA/MD, 2000 (Boynton)	WP	0.183- 0.185		487-490	4	7	0.05, <u>0.05</u>	Thompson, 2006, 00-MD12
USA/GA, 2000 (Keystone)	WP	0.188- 0.191		469-475	5	7	0.08, <u>0.15</u>	Thompson, 2006, 00-GA*23
USA/FL, 2000 (Camelot)	WP	0.184- 0.187		275-280	5	0 7 14	0.21, 0.24 0.10, <u>0.12</u> 0.07, 0.08	Thompson, 2006, 00-FL59
USA/TX, 2000 (Jupiter)	WP	0.183- 0.194		387-406	4	0 7 14	0.19, 0.27 0.17, <u>0.20</u> 0.15, 0.16	Thompson, 2006, 00-TX45
USA/OH, 2000 (King Arthur)	WP	0.185- 0.193		424-442	4	6	0.14, <u>0.15</u>	Thompson, 2006, 00-OH*18

Peppers country, year (variety)	Application					PHI Days	Residues, mg/kg ^a	Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.			
USA/CA, 2000 (Jupiter)	WP	0.187- 0.189		375-377	4	7	0.03, <u>0.04</u>	Thompson, 2006, 00-CA111
Non-bell pepper								
USA/TX, 2000 (Sonora Anaheim)	WP	0.187- 0.190		448-456	4	6	0.16, <u>0.20</u>	Thompson, 2006, 00-TX*44
USA/FL, 2000 (Mesilla)	WP	0.186- 0.189		278-283	5	0 7 14	0.29, 0.51, 0.52 0.14, <u>0.21</u> 0.09, 0.15	Thompson, 2006, 00-FL60
USA/CA, 2000 (Mitla jalapeno)	WP	0.187- 0.188		374-380	4	7	0.05, <u>0.05</u>	Thompson, 2006, 00-CA112

Almonds

A total of ten trials on almonds were conducted in USA using either a SC formulation containing 235 mg/L fenbuconazole or a WP formulation containing 750 g/L.

The analytical method was validated with analyses by spiking control samples with fenbuconazole. The limit of quantification (LOQ) for nutmeat was 0.01 mg/kg, and for hulls 0.02 mg/kg.

Table 17 Fenbuconazole residues in almonds from supervised trials in USA

Almonds country, year (variety)	Application					PHI Days	Residues		Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.		Portion analysed	mg/kg	
GAP, USA	SC	0.067		187	3	160			
	WP	-0.105							
USA/CA, 1987 (Mission)	SC	0.112			3	154	nutmeat hulls	<u>≤ 0.01</u> <u>0.77</u>	Stavinski <i>et al.</i> , 1989, RVR 87-0380
		0.224			3	154	nutmeat hulls	< 0.01 1.03	
USA/CA, 1987 (Carmel)	SC	0.112			3	200	nutmeat hulls	<u>≤ 0.01</u> <u>0.099</u>	Stavinski <i>et al.</i> , 1989, RVR 87-0454
USA/CA, 1987 (Carmel)	SC	0.112			3	161	nutmeat hulls	<u>≤ 0.01</u> <u>0.133</u>	Stavinski <i>et al.</i> , 1989, RVR 87-0407
		0.224			3	161	nutmeat hulls	< 0.01 0.644	
USA/CA, 1989 (Thompson)	SC	0.112			3	161	nutmeat hulls	<u>≤ 0.01</u> <u>0.454</u>	Stavinski <i>et al.</i> , 1989, RVR 89-0015
USA/CA, 1987 (Thompson)	SC	0.112			3	152	nutmeat hulls	<u>≤ 0.01</u> <u>0.505</u>	Stavinski <i>et al.</i> , 1989, RVR 87-0379
		0.224			3	152	nutmeat hulls	< 0.01 0.525	
USA/CA, 2000 (Nonpareil)	SC	0.210		2101	3	45	nutmeat hulls	< 0.01, < 0.01 3.36, 4.53	Pierce, 2001, RAR 00-0016
USA/CA, 2000 (Carmel)	SC	0.210		794	3	45	nutmeat hulls	< 0.01, < 0.01 9.99, 10.4	Pierce, 2001, RAR 00-0017
USA/CA, 2000 (Nonpareil)	SC	0.210		962	3	45	nutmeat hulls	< 0.01, < 0.01 2.22, 2.41	Pierce, 2001, RAR 00-0018

Almonds country, year (variety)	Application					PHI Days	Residues		Ref
	Form	kg ai/ha	kg g ai/L	water, L/ha	no.		Portion analysed	mg/kg	
USA/CA, 2000 (Nonpareil)	SC	0.210		1747	3	45	nutmeat hulls	< 0.01, < 0.01 1.77, 1.97	Pierce, 2001, RAR 00-0019
	WP	0.210		1756	3	45	nutmeat hulls	< 0.01, < 0.01 2.11, 2.7	
USA/CA, 2000 (Nonpareil)	SC	0.210		2130	3	41	nutmeat hulls	< 0.01, < 0.01 2.86, 3.24	Pierce, 2001, RAR 00-0020
						45	nutmeat hulls	< 0.01, < 0.01 3.59, 3.74	
						49	nutmeat hulls	< 0.01, < 0.01 3.34, 4.77	
						55	nutmeat hulls	< 0.01, < 0.01 1.1, 2.62	

Note: The residues in hulls used for estimation of maximum residue level are underlined.

Peanuts

Thirteen supervised trials on peanuts were conducted in USA using a SC formulation containing 240 g/L fenbuconazole.

The analytical method was validated with analyses by spiking control samples with fenbuconazole. The limit of quantification (LOQ) for nutmeat and hay was 0.03 mg/kg.

Table 18 Fenbuconazole residues in peanuts from supervised trials in USA

Peanuts country, year (variety)	Application					PHI Days	Residues		Ref
	Form	kg ai/ha	kg g ai/l	water, L/ha	no.		Portion analysed	mg/kg	
<i>GAP, USA</i>	SC	0.069- 0.135		187	4	14			
USA/GA, 1991 (Florunner)	SC	0.140		187	8	14	nutmeat hay	<u>≤ 0.03</u> 4.72	Ross, 1999, RAR 91-0126
USA/AL, 1992 (Florunner)	SC	0.140		195-197	8	15	nutmeat hay	<u>≤ 0.03</u> , < 0.03 1.07	Ross, 1999, RAR 92-0138
USA/NC, 1994 (VC-1)	SC	0.140		308	8	14	nutmeat hay	<u>0.035</u> 7.14	Ross, 1999, RAR 94-0144
USA/VA, 1994 (NC-7)	SC	0.140		308	8	14	nutmeat hay	<u>≤ 0.03</u> 4.37	Ross, 1999, RAR 94-0151
USA/OK, 1994 (Spanco)	SC	0.140		191-204	8	15	nutmeat hay	<u>≤ 0.03</u> 0.777	Ross, 1999, RAR 94-0162
USA/AL, 1994 (GK-7)	SC	0.140		185-243	8	14	nutmeat hay	<u>≤ 0.03</u> 1.15	Ross, 1999, RAR 94-0181
USA/GA, 1994 (Florunner)	SC	0.140		184-190	8	14	nutmeat hay	<u>≤ 0.03</u> 1.64	Ross, 1999, RAR 94-0183
USA/TX, 1994 (Florunner)	SC	0.140		188-197	9	14	nutmeat hay	<u>≤ 0.03</u> 4.07	Ross, 1999, RAR 94-0167
USA/GA, 1994 (Florunner)	SC	0.140		184-190	8	14	nutmeat hay	<u>≤ 0.030</u> 1.18	Ross, 1999, RAR 94-0182
USA/GA, 1995 (Florunner)	SC	0.140		280-290	8	14	nutmeat hay	<u>≤ 0.03</u> , < 0.03 1.35, 3.93	Ross, 1999, RAR 95-0151
USA/GA, 1995 (Florunner)	SC	0.140		214-224	8	14	nutmeat hay	<u>≤ 0.03</u> , < 0.03 1.04, 1.25	Ross, 1999, RAR 95-0218
USA/FL, 1997 (Georgia Green)	SC	0.140		168-174	6	14	nutmeat hay	<u>≤ 0.03</u> , < 0.03 5.24, 5.83	Ross, 1999, RAR 97-0076
		0.700		168-174	6	14	nutmeat hay	< 0.03, 0.04 42.3, 43.2	

Peanuts country, year (variety)	Application					PHI Days	Residues		Ref
	Form	kg ai/ha	kg g ai/l	water, L/ha	no.		Portion analysed	mg/kg	
USA/OK, 1997 (Spanco)	SC	0.140		95-201	8	14	nutmeat hay	0.042, <u>0.054</u> 1.06, 2.33	Ross, 1999, RAR 97-0077
		0.700		95-202	8	14	nutmeat hay	0.26, 0.28 7.08, 9.02	

FATE OF RESIDUES IN STORAGE AND PROCESSING

In Processing

The Meeting received information on the fate of fenbuconazole residues during the processing of citrus (grapefruit and oranges) and apple.

Citrus and apple of the crops that the Meeting received information on supervised field trials are normally processed prior to consumption. Processing factors have been calculated for fenbuconazole residues in citrus and apple.

Citrus

In two trials in USA, oranges and grapefruit were treated with three applications of a SC formulation containing 236 g/L fenbuconazole at a rate of 0.280 kg ai/ha per application. The fruits were harvested 7 days after the last treatment. The harvested samples were processed normal procedures for processing commercially grown oranges and grapefruit.

Table 19 Fenbuconazole residues in citrus from supervised trials in USA

Citrus country, year (country)	Application				PHI Days	Commodity	Residues		Ref.
	Form	kg ai /ha	water, L/ha	no.			mg/kg	Processing factor	
USA/FL, 1994 Grapefruit (White Marsh)	SC	0.280	990- 1037	3	7	Unwashed fruit	0.039		Ross, 1997 RAR 94-0064
						Washed fruit	0.024	0.615	
						Fresh juice	< 0.01	< 0.256	
						Dried pulp	0.302	7.74	
						Cold press oil	2.60	66.7	
USA/FL, 1994 Orange (Valencia)	SC	0.280	990- 1037	3	7	Unwashed fruit	0.049		Ross, 1997 RAR 94-0065
						Washed fruit	0.044	0.898	
						Fresh juice	< 0.01	< 0.204	
						Dried pulp	0.309	6.31	
						Cold press oil	2.40	49.0	

Apple

In a trial in USA, apples were treated with nine foliar applications of an EC formulation containing 236 g/L fenbuconazole at 1.26 kg ai/ha and harvested samples 14 days after the last application. The harvested fresh apples were washed (typical commercial practice) and processed into apple juice (both unpasteurized and pasteurized) and wet pomace. Residue data are summarized in Table 20.

Table 20 Fenbuconazole residues in processed commodities of apple from processing trials

Apple country, year (country)	Application				PHI Days	Commodity	Residues		Ref.
	Form	kg ai /ha	water, L/ha	no.			mg/kg	Processing factor	
USA/PA, 1994 (Red Delicious)	EC	0.140	467	9	14	Unwashed fruit Washed fruit Wet pomace Unpasteurized juice Pasteurized juice	0.0610 0.0656 0.152 0.0038 < 0.010	1.08 2.49 0.062 < 0.164	Batra, 1995, RAR 94-0123

Peanut

In a trial in USA, peanuts were treated with eight foliar applications of a SC formulation containing 240 g/L fenbuconazole at a nominal rate of 5.60 kg ai/ha and harvested samples 14 days after the last application. The peanuts were shelled in a peanut sheller and passed through an aspirator to remove hull material. The kernel was oven-dried, heated, and pressed in an expeller to squeeze out part of crude oil (expelled oil). The presscake was extracted with hexane to generate solvent extracted oil. The oil was refined with NaOH to form refined oil and the presscake was dried to generate meal.

Table 21 Fenbuconazole residues in processed commodities of peanut from processing trials

Peanut country, year (country)	Application				PHI Days	Commodity	Residues		Ref.
	Form	kg ai /ha	water, L/ha	no.			mg/kg	Processing factor	
USA/OK, 1997 (Spanco)	SC	0.700	95-202	8	14	Nutmeat Meal Expelled oil Refined oil	0.251 0.125 0.331 0.325	0.498 1.32 1.29	Ross, 1999, RAR 97-0077

APPRAISAL

Fenbuconazole was evaluated for residues and toxicology by the JMPR in 1997. An ADI of 0–0.03 mg/kg bw was established and a number of maximum residue levels were recommended.

Fenbuconazole was scheduled by the 40th Session of the CCPR for a residue evaluation for additional crops (ALINORM 08/31/24, Appendix X). Information on current GAPs and new supervised trial data were submitted to the 2009 JMPR for lemons, blueberry, cranberry, plums, peppers, almonds and peanuts and additional residue trial information was also provided for grapefruit, oranges and apples.

Results of supervised residue trials on crops

The NAFTA calculator was used as a tool in the estimation of the maximum residue levels from the selected residue data sets obtained from trials conducted according to GAP. As a first step, the Meeting reviewed all relevant factors related to each data set in arriving at a best estimate of the maximum residue level using expert judgement. Then, the NAFTA calculator was employed. If the statically calculation spreadsheet suggested a different value from that recommended by the JMPR, a brief explanation of the deviation was supplied. Some common factors that may lead to rejection of the statically estimate include when the number of data points in a data set is < 15 or when there are a large number of values < LOQ.

As the last application contributed most to the residues of fenbuconazole at harvest, the Meeting agreed to use the data from trials where the application number exceeded that specified in the matching GAP.

Citrus fruits

The GAP for citrus in the USA is 3×0.135 kg ai/ha with a PHI of 0 day. Information from nine trials on grapefruit, 16 trials on oranges and five trials on lemons were conducted in the USA (3×0.280 kg ai/ha, PHI 0 day). However, as the application rate did not match the US GAP the Meeting was unable to estimate a maximum residue level for fenbuconazole in citrus.

Pome fruits

The GAP on apples in France is 3×0.04 – 0.05 kg ai/ha and in Spain 4×0.05 kg ai/ha, with a PHI of 28 days. In Southern European trials conducted in accordance with French and Spanish GAP, fenbuconazole residues in rank order ($n = 18$) were: 0.01, < 0.02, 0.02 (2), 0.03 (4), 0.04 (3), 0.05, 0.06 (2), 0.16, 0.17, 0.18 and 0.33 mg/kg.

The GAP on apples in the UK is 10×0.07 kg ai/ha with a PHI of 28 days. In Northern European trials conducted in accordance with the GAP of the UK, fenbuconazole residues in rank order ($n = 14$) were: 0.02 (3), 0.03 (4), 0.04 (3), 0.05 (2) and 0.06 (2) mg/kg.

The GAP on apples in the USA is 4×0.105 – 0.13 kg ai/ha with a PHI of 14 days. In the US trials matching US GAP, fenbuconazole residues in rank order ($n = 16$) were: 0.02, 0.05, 0.06 (2), 0.07, 0.08, 0.09, 0.12 (2), 0.13, 0.15, 0.17, 0.18, 0.20 (2) and 0.28 mg/kg.

The supervised residue trials for pears in Southern Europe submitted to the 1997 JMPR did not match Italian or Spanish GAP.

The residues in pears were lower than those in apples. The Meeting agreed that the dataset for apples could be used to estimate a maximum residue level for pome fruits.

Based on the US trials, which led to higher residues, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in pome fruits of 0.5, 0.12 and 0.28 mg/kg, respectively. The Meeting withdrew the previous recommendation of a maximum residue level of 0.1 mg/kg for pome fruits.

The maximum residue level estimate derived from use of the NAFTA calculator (95/99 Rule 99th percentile) was 0.5 mg/kg, which was in agreement with the estimate made by the Meeting.

Plums

The GAP on plums in France is 5×0.05 – 0.075 kg ai/ha with a PHI of 3 days. In trials from northern France, conducted in accordance with French GAP, fenbuconazole residues ($n = 5$) in rank order were: 0.04, 0.06, 0.08, 0.10 and 0.17 mg/kg.

Based on the trials from northern France, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in plums of 0.3, 0.08 and 0.17 mg/kg, respectively.

The maximum residue level estimate derived from use of the NAFTA calculator (95/99 Rule 99th percentile) was 0.3 mg/kg, which agreed with the estimate made by the Meeting.

Blueberries

The GAP on blueberries in the USA is 4×0.11 – 0.14 kg ai/ha with a PHI of 30 days. In the US trials conducted with foliar application in accordance with the US GAP, fenbuconazole residues in rank order ($n = 9$) were 0.01, 0.03 (2), 0.06 (2), 0.07 (2), 0.10 and 0.20 mg/kg.

Based on the US trials, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in blueberries of 0.5, 0.06 and 0.20 mg/kg respectively.

The maximum residue level estimate derived from use of the NAFTA calculator was 0.4 mg/kg (95/99 Rule and UCLMedian95th). The Meeting noted that the maximum application rate in the trials was 25% less than that specified in the matching maximum GAP. The Meeting considered that the estimate derived from use of the NAFTA calculator may not accommodate all uses of fenbuconazole in blueberries and agreed that a higher maximum residue level recommendation was warranted.

Cranberries

The GAP on cranberries in the USA is $4 \times 0.105\text{--}0.211$ kg ai/ha with a PHI of 30 days. In the US trials conducted in accordance with the US GAP, fenbuconazole residues ($n = 5$) in ranked order were: 0.09 (2), 0.13, 0.15 and 0.45 mg/kg.

Based on the US trials, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in cranberries of 1, 0.13 and 0.45 mg/kg respectively.

The maximum residue level estimate derived from use of the NAFTA calculator (95/99 Rule 99th percentile) of 0.7 mg/kg differed from the estimate of 1 mg/kg made by the Meeting. The Meeting considered that due to the level of uncertainty involved with estimates based on small datasets a higher estimate was more appropriate.

Peppers

The GAP on peppers in the USA is $4 \times 0.105\text{--}0.211$ kg ai/ha with a PHI of 7 days. In the US trials on bell peppers and non-bell peppers, conducted in accordance with the US GAP, fenbuconazole residues ($n = 6$) in rank order were 0.04, 0.05, 0.12, 0.15 (2) and 0.20 mg/kg for bell peppers, and ($n = 3$) 0.05, 0.20 and 0.21 mg/kg for non-bell peppers. As the residue populations from trials on bell peppers and non-bell peppers were not significantly different (Mann-Whitney U-test), the Meeting agreed that they could be combined. The residues in peppers in rank order ($n = 9$) were 0.04, 0.05 (2), 0.12, 0.15 (2), 0.20 (2) and 0.21 mg/kg.

Based on the US trials, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in peppers of 0.6, 0.15 and 0.21 mg/kg respectively.

The maximum residue level estimate derived from use of the NAFTA calculator (95/99 Rule 99th percentile) of 0.6 mg/kg corresponded to the estimate made by the Meeting.

Tree nuts (Almonds and Pecans)

The GAP on almonds in the USA is $3 \times 0.067\text{--}0.105$ kg ai/ha with a PHI of 160 days. In the US trials conducted in accordance with the US GAP, fenbuconazole residues in nutmeat ($n = 5$) were < 0.010 (5) mg/kg.

The 1997 JMPR recommended a maximum residue level of 0.05(*) mg/kg for pecan based on supervised residue trials from the USA conducted in 1990 and 1994. In ten US trials conducted in accordance with the US GAP, fenbuconazole residues were < 0.01 (10) mg/kg in pecan kernels.

Based on the US trials for almonds and pecans, the Meeting estimated a maximum residue level of 0.01(*) mg/kg, and an STMR value and HR value of 0 mg/kg for fenbuconazole in tree nuts. The Meeting withdrew the previous recommendation of 0.05(*) mg/kg for pecan.

The NAFTA calculator was not used to derive an estimate as all residue values were below the LOQ, making its application unsuitable.

Peanuts

The GAP on peanuts in the USA is 4×0.069 –0.135 kg ai/ha with a PHI of 14 days. In US trials, conducted with six or eight foliar applications at a rate of 0.140 kg ai/ha and a PHI of 14 days, fenbuconazole residues in peanuts in rank order (n = 13) were: < 0.03 (11), 0.04 and 0.05 mg/kg.

Based on the US trials, the Meeting estimated a maximum residue level, an STMR value and an HR value for fenbuconazole in peanuts of 0.1, 0.03 and 0.05 mg/kg respectively.

The NAFTA calculator was not used to derive an estimate as the residues from eleven, of thirteen trials matching GAP, were below the LOQ, making its application unsuitable.

*Animal feed commodities**Almond hulls*

In US trials conducted in accordance with the GAP of the USA (0.105 kg ai/ha, PHI of 160 days), fenbuconazole residues in almond hulls, in rank order (n = 5), were: 0.10, 0.13, 0.45, 0.51 and 0.77 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for fenbuconazole in almond hulls of 3 and 0.45 mg/kg respectively.

The maximum residue level estimate derived from use of the NAFTA calculator was 2.5 mg/kg (95/99 Rule 99th percentile). The normal JMPR procedure is to use one significant figure for maximum residue levels below 10 mg/kg. Rounding up the value derived from use of the calculator corresponded to the Meeting's recommendation.

Peanut fodder

In US trials conducted in accordance with the GAP of the USA, i.e., 0.135 kg ai/ha with a PHI of 14 days, fenbuconazole residues in peanut hay, in rank order (n = 13), were: 0.78, 1.1, 1.2 (2), 1.3, 1.6, 2.3, 3.9, 4.1, 4.4, 4.7, 5.8 and 7.1 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and a highest residue value for fenbuconazole in peanut fodder of 15, 2.3 and 7.1 mg/kg respectively.

The normal JMPR procedure is to round the value to the nearest 5 for maximum residue levels between 10 and 30 mg/kg. Rounding up the value obtained from NAFTA calculator of 14 mg/kg (95/99 Rule and UCLMedian 95th) results in an estimate of 15 mg/kg, corresponding to the recommendation of the current Meeting.

Fate of residues during processing

The Meeting received information on the fate of incurred residues of fenbuconazole during the processing of citrus (grapefruit and oranges), apples and peanuts. Based on the results of processing studies processing factors were calculated for apples and peanuts and are shown in the Table below. As no maximum residue level for citrus was estimated, processing factors are not reported.

Processing (Transfer) factors from the processing of Raw Agricultural Commodities (RACs) with field-incurred residues from foliar treatment with fenbuconazole

Commodity	Processing factor	STMR-P mg/kg
Apple		
Unwashed fruit	-	0.12 (STMR for RAC)
Wet pomace	2.5	0.30
Unpasteurized juice	0.06	0.01
Pasteurized juice	< 0.16	0.02
Peanut		

Commodity	Processing factor	STMR-P mg/kg
Nutmeat		0.03 (STMR for RAC)
Meal	0.50	0.02
Refined oil	1.3	0.04

As the STMR-P value of unpasteurized apple juice is higher than that of pasteurized juice, the value for unpasteurized juice is used for dietary risk assessment

The Meeting estimated a maximum residue level of 1 mg/kg ($0.12 \times 2.5 \times 100/40 = 0.75$ mg/kg) on a dry weight basis for apple pomace, dry.

On the basis of the STMR and HR for bell peppers and the default dehydration factor of 10, the Meeting estimated an STMR value and an HR value for dried chilli peppers of 1.5 and 2.0 mg/kg respectively. Based on the HR value, the Meeting recommended a maximum residue level of 2 mg/kg for chilli peppers (dry).

Residues in animal commodities

Farm animal feeding studies

A lactating dairy cow feeding study and a laying hen feeding study were previously submitted to the 1997 JMPR.

Farm animal dietary burden

The Meeting estimated the dietary burden of fenbuconazole in livestock on the basis of the diets listed in Annex 6 of the 2006 JMPR Report (OECD Feedstuffs Derived from Field Crops), and the STMR or highest residue levels estimated at the present Meeting. 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. The percentage dry matter is taken as 100% when the highest residue levels and STMRs are already expressed in a dry weight basis.

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculations for beef cattle, dairy cattle, broilers and layers are provided in Annex 6 of the 2009 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 JMPR Report).

	Livestock dietary burden, fenbuconazole, ppm of dry matter diet					
	US-Canada		EU		Australia	
	max	mean	max	mean	max	mean
Beef cattle	2.6	1.0	1.0	0.48	6.2 ^a	2.1 ^b
Dairy cattle	2.1	0.80	0.93	0.41	5.7	2.0 ^c
Poultry – broiler	0.03	0.03	0.03	0.03	0.02	0.02
Poultry – layer	0.03	0.03	0.31 ^d	0.13 ^e	0.02	0.02

^a Highest maximum beef or dairy cattle dietary burden suitable for MRL estimates for mammalian meat and milk

^b Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian meat

^c Highest mean dairy cattle dietary burden suitable for STMR estimates for milk

^d Highest maximum poultry dietary burden suitable for MRL estimates for poultry meat and eggs

^e Highest mean poultry dietary burden suitable for STMR estimates for poultry meat and eggs

Animal commodity maximum residue levels

Because of the changes in the animal dietary burden, the residue concentrations in animal products were re-calculated by the current Meeting.

The calculated maximum dietary burden for beef and dairy cattle was 6.2 ppm. In the cattle feeding study described in the 1997 JMPR Monograph, no residues were found above the LOQ of 0.01 mg/kg in milk at feeding level of 6.5 ppm.

Residues of fenbuconazole in muscle were < 0.01 (2) and 0.01 mg/kg at dose level of 6.5 ppm. Residues in kidneys were below the LOQ of 0.01 mg/kg for all dose groups. Residues in liver were 0.04, 0.06 and 0.09 mg/kg at dose level of 6.5 ppm.

Summary of residues corresponding to the estimated dietary burden

Dietary burden (ppm) Feeding level [ppm]	Muscle	Liver
MRL	highest	highest
MRL beef or dairy cattle (6.2) [6.5]	(0.01) [0.01]	(0.09) [0.09]
STMR	mean	mean
STMR beef or dairy cattle (2.1) [6.5]	(0.003) [0.01]	(0.02) [0.06]

The Meeting estimated a maximum residue level of 0.01 mg/kg in mammalian meat, 0.1 mg/kg in mammalian edible offal and 0.01(*) mg/kg in milks, and an HR of 0.01 mg/kg in mammalian meat and 0.09 mg/kg in mammalian edible offal. The Meeting withdrew the previous recommendations of maximum residue levels of 0.05(*) mg/kg for cattle meat, cattle fats, cattle kidney and cattle milk.

The mean estimated dietary burden for dairy cattle was 2.0 ppm. No detectable fenbuconazole residues (< 0.01 mg/kg) were found in any sample of milk at the 6.5 ppm feeding level. The Meeting therefore estimated an STMR of 0 mg/kg in milk.

The mean estimated dietary burden for beef cattle was 2.1 ppm. In kidney, no fenbuconazole residues were detected at the 6.5 ppm feeding level. Since residues above the LOQ were found in muscle and liver at a dose of 6.5 ppm, detectable residues of fenbuconazole were expected in muscle and liver at the mean dietary burden of 2.1 ppm. The Meeting estimated an STMR of 0.003 mg/kg in meat, 0.02 mg/kg in offal.

The calculated maximum dietary burden for poultry was 0.31 ppm. In the poultry feeding study, residues of fenbuconazole were below the LOQ of 0.01 mg/kg in muscle, liver and eggs at all feeding level tested (0.12–1.13 ppm).

The Meeting estimated a maximum residue level of 0.01(*) mg/kg in poultry meat, poultry edible offal and eggs. The Meeting withdrew the previous recommendations of 0.05(*) mg/kg in poultry meat, poultry fats, poultry edible offal and eggs.

The mean estimated dietary burden for poultry was 0.13 ppm. The Meeting estimated STMRs and HRs of 0 mg/kg in poultry meat, offal and eggs.

RECOMMENDATIONS

On the basis of the data from supervised trials, the Meeting concluded that the residue levels listed below are suitable for establishing maximum residue limits and for dietary intake assessment.

Definition of the residue (for compliance with the MRL and for estimation of dietary intake, for plant and animal commodities): *Fenbuconazole*

Commodity		Recommended MRL mg/kg		STMR or STMR-P, mg/kg	HR or HR-P, mg/kg
CCN	Name	New	Previous		
AM 0660	Almond hulls	3		0.45	
JF 0226	Apple juice			0.01	
AB 0226	Apple pomace, dry	1		0.75	
FB 0020	Blueberries	0.5		0.06	0.20
MM 0812	Cattle meat	W	0.05*		
MF 0812	Cattle fats	W	0.05*		
MO 1280	Cattle kidney	W	0.05*		
MO 1281	Cattle liver	W	0.05		
ML 0812	Cattle milk	W	0.05*		
HS 0444	Chilli peppers (dry)	2		1.5	2.0
FB 0265	Cranberry	1		0.13	0.45
MO 0105	Edible offal (mammalian)	0.1		0.02	0.09
PE 0112	Eggs	0.01*	0.05*	0	0
MM 0095	Meat (from mammals other than marine mammals)	0.01		0.003	0.01
ML 0106	Milks	0.01*		0	
SO 0697	Peanut	0.1		0.03	0.05
OR 0697	Peanut oil, edible			0.04	
AL 0697	Peanut fodder	15		2.3	7.1
TN 0672	Pecan	W	0.05*		
VO 0051	Peppers	0.6		0.15	0.21
FS 0014	Plums (including prunes)	0.3		0.08	0.17
FP 0009	Pome fruits	0.5	0.1	0.12	0.28
PM 0110	Poultry meat	0.01*	0.05*	0	0
PF 0111	Poultry fats	W	0.05*		
PM 0111	Poultry, edible offal of	0.01*	0.05*	0	0
TN 0085	Tree nuts	0.01*		0	0

* at or about the LOQ.

DIETARY RISK ASSESSMENT

Long-term intake

In the current evaluation STMRs were estimated for 17 commodities. Where consumption data were available the STMRs were used in dietary intake estimates together with previous MRL recommendations for 18 other food commodities. The results are shown in Annex 3 of the 2009 JMPR Report.

The estimated daily intakes for the 13 GEMS/Food Consumption Cluster Diets were in the range of 0 to 2% of the maximum ADI (0.03 mg/kg bw). The Meeting concluded that the long-term intake of residues of fenbuconazole resulting 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 fenbuconazole was calculated for 16 food commodities (and their processed fractions) for which maximum residue levels were estimated at the present meeting and for which consumption data were available. The results are shown in Annex 4 of the 2009 JMPR Report.

As the Meeting has not yet considered the need of an ARfD, the acute risk assessment for fenbuconazole was not finalized.

REFERENCES

Author	Year	Title, Institution, Report reference
Stevenson, K	2005	To Determine the Magnitude of Fenbuconazole residues at harvest and at intervals in the raw agricultural commodity apples resulting from sequential overall applications of GF-1339, In Southern France and Spain, 2004 Report No. AF7782DE DERBI No. 224630
Balluff, M	2006	Residues of Fenbuconazole in Apple at interval or at harvest following multiple applications of GF-1339, Northern European Zone (France, Germany, UK) 2006 Report No. GHE-P-11617
Balluff, M	2006	Residues of Fenbuconazole in Apple at interval or at harvest following multiple applications of GF-1339, Southern European Zone (France, Spain) 2006 Report No. GHE-P-11616
Lees, M. J	1998	Fenbuconazole and the Metabolites RH-9129 and RH-9130 on Plum Report No. 982848 DERBI No. 149780
Gilbert, J. M	1999	Fenbuconazole and Its Metabolites RH-9129 and RH-9130 on Plum Report No. 985241 DERBI No. 207096
Balluff, M	2007	Residues of Fenbuconazole in Plums at Harvest following multiple applications of GF-1339, Northern European Zone (France) 2006 Report No. 060044 Study No. 20064015/F1-FPPL
Thompson, D.C	1998	Fenbuconazole: Magnitude of residue on Blueberry (High Bush) Report No. IR-4 06368 DERBI No. 95394 Unpublished
Thompson, D.C	2000	Fenbuconazole: Magnitude of residue on Blueberry (High Bush) Report No. IR-4 A6368 DERBI No. 138620 Unpublished
Batra, R and Cressman, B	1996	RH-7592 Fungicide Field Residue Studies on Citrus (grapefruit & oranges): RAR 93-0001, 0002, 0003, 0004, 0007, 0008 Revision to 34A-93-20 Report No. 34-96-164 DERBI No. 95427 Unpublished
Ross, J.W	1998	Fenbuconazole (RH-7592) Field Residue Trials in Oranges: RAR 97-0109, 97-0120, 97-0121, 97-0122, 97-0124, 97-0125, 97-0126 Report No. 34-98-06 DERBI No. 95500 Unpublished
Ross, J.W	2001	Fenbuconazole (RH-7592 2F) Field Residue Study in Lemon: RAR 00-0011, 00-0012, 00-0013, 00-0014, 00-0015 Report No. 34-00-94 DERBI No. 138575 Unpublished
Ross, J.W	1997	Magnitude of Fenbuconazole (RH-7592) Residue in Processed Grapefruit and Oranges: RAR 94-0064 and 94-0065 Report No. 34-97-64 DERBI No. 95697 Unpublished
Thompson, D.C	2000	Magnitude of Residue on Cranberry MA01, NJ11, OR12, WI08, WI09 Report No. 06853 DERBI 138621 (MRID 45296001) Unpublished
Ross, J.W	1999	Fenbuconazole (RH-7592 2F) Residue Studies in Peanuts and Peanut Process Fractions: 1991, 1994, 1995 and 1997 Trials Report No. TR 34-98-91 (MRID 44869102) DERBI 110039 Unpublished
Stavinski, S.S	1989	RH-7592 Total Residues Data for Almond Nutmeat and Hull, RAR 87-0380, 87-0454, 87-0407, 89-0015, 87-0379 Report No. 34A-89-44 (MRID 41229703) DERBI 95735 Unpublished
Burnett, T.F and Martin, J.J	1992	Magnitude of RH-7592 Residues in Fresh and Processed Apples Report No. 34-92-43 (MRID 42418202) DERBI 95731

Author	Year	Title, Institution, Report reference
		Unpublished
Ross, J	1997	Residues in Orchard Matrices After Airblast Application Report No. TR-34-97-28 DERBI 95367
Martin, J.J <i>et al</i>	1988	RH-7592 Parent Residue Data for Plums, RAR 87-0206, 87-0258, 87-0204, 87-0163 Report No. 34A-88-69 DERBI 95527
Batra, R and Cressman, B	1996	Fenbuconazole (RH-7592) Field Residue Trials in Apples: RAR 95-0117, 95-0150, 95-0153, 95-0161, 95-0171, 95-0198, and 95-0253 Report No. 34-96-68 DERBI 95530
Pierce, G.C	2001	Fenbuconazole (RH-7592) Field Residue and Formulation Bridging Study in Almond: RAR 00-0016, 00-0017, 00-0018, 00-0019, 00-0020 Report No. 34-01-80 DERBI 99511
McCormick, R.W	2006	Residue of Fenbuconazole and Triazole Metabolites in Grapefruit Report No. -41018 DERBI 224588 Non-GLP
Ross, J.W	1999	Storage Stability Study: RH-7592, RH-9129 and RH-9130 in Citrus Fruit, Dried Pulp and Oil Report No. 34-99-20 DERBI 95601
Batra, R	1995	Magnitude of Fenbuconazole (RH-7592) Residues in Processes Apples: RAR 94-0123 Report No. 34-95-10 (MRID 43621001) DERBI 95529
Ross, J.W	1997	Additional Fortification Data in Apple, Wet apple Pomace and Apple Juice Using Confirmatory Analysis Technique from the Tolerance Enforcement Method for Parent RH-7592 and Its Metabolites RH-9129 and RH-9130 in Fresh and Processed Apples Report No. TR34-96-179 MRID 44350701 DERBI 95531
Stavinski, S.S <i>et al</i>	1991	RH-7592 Storage Stability in Stone fruit: Cherry, Plum and Peach Report No. 34-91-16 MRID 41875037 DERBI 95517
Stavinski, Burnet, Martin	1992	RH-7592 Almond Nutmeat and Hull Storage Stability, Aged Field Residues Report No. 34-92-62 MRID 42658201 DERBI 95740
Wickremesinhe, E	1996	Method Validation for Apple by TR #34-96-23 Preliminary Analytical Method for the Determination of Indar Metabolite RH 127,905 in Apples, Bananas and Wheat Grain Report No. 34-96-90 MRID 44244101 DERBI 95740
Ross, J.W	1999	Storage Stability of RH-127,905 residues in Apples, Bananas, and Citrus under conditions of frozen storage Report No. 34-99-90 DERBI 95421
Meyer, A.L	1998	The Storage Stability of RH-7592 Conjugates in Peanut Vines and Nuts Report No. TR34-97-67 MRID 44869109 DERBI 95600
Thompson, D.C	2006	Fenbuconazole Magnitude of Residue on Pepper IR-4 06372 DERBI 200400

