

BUPROFEZIN (173)

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EXPLANATION

Buprofezin, insecticide, was evaluated by JMPR in 1991 for the first time and then in 1995 and 1999. It was also reviewed under the Periodic Re-evaluation programme in 2008 for toxicity and residues. The 2008 JMPR allocated an ADI of 0–0.009 mg/kg bw and ARfD of 0.5 mg/kg bw. It concluded that the residue definition for compliance with the MRL and for estimation of dietary intake, both for animal and plant commodities should be buprofezin and recommended eight maximum residue levels while withdrawing one previous recommendation.

The current Meeting received information on use pattern and trials concerning pome fruits, stone fruits, berry fruits, tropical fruits, cucurbits, fruiting vegetables other than cucurbits, beans, olives, tree nuts and coffee. The Meeting also received information on some storage stability studies additional to those submitted to the 2008 JMPR.

METHODS OF RESIDUE ANALYSIS

Stability of pesticide residues in stored analytical samples

The 2008 JMPR evaluated storage stability of buprofezin, 4-hydroxybuprofezin, reverse Schiff base and isopropylphenylurea in frozen samples of lettuce, tomato, dry tomato pomace, tomato juice, tomato paste, cucumber, citrus fruits and grape. It concluded that buprofezin was stable when stored frozen up to 32 months in crops with high water content (32 months in lettuce, 30 months in tomato, and five months in cucumber), up to 12 months in crops with high acid content (12 months in citrus fruits and four months in grapes), up to six months in dry tomato pomace and tomato juice, and six months in tomato paste. The 2008 Meeting extrapolated 32 months of storage stability for apple, pear, persimmon, custard apple, mango and eggplant samples from crops with high water content and considered that the storage stability for processed commodities of citrus and grapes to be adequately covered by the storage stability data on the raw commodities.

The current Meeting received storage stability studies conducted in 2006 on banana, potato, wheat, almond, grape, orange, and some of their processed products (Reed, 2006, R-1189). The results of studies are summarized below.

The ground plant matrices, orange and grape juices and milk were fortified with buprofezin, reverse Schiff base (BF9), isopropylphenylurea (BF12) and/or 4-hydroxyacetanilide (BF23) at 0.1 mg/kg (other than orange oil and almond hulls) or 0.5 mg/kg (orange oil and almond hulls) and stored frozen at -20 ± 5 °C for specified intervals. The concentrations of these compounds in the various matrices were analysed with GC/NPD methods with the LOQ of 0.01 mg/kg (other than orange oil and almond hulls) or 0.05 mg/kg (orange oil and almond hulls).

Stability data are summarized in Table 1 below.

Table 1 Storage stability of buprofezin and some of its metabolites under -20 ± 5 °C

Analyte	Commodity	Fortification mg/kg	Storage days	% Remaining		Mean concurrent recovery, %
				Individual results	Mean	
Buprofezin	Whole banana	0.1	0			90
			70	101, 100	100	100
	Potato tubers	0.1	0	103, 103	103	103
			371	82, 86	84	99
			874	73, 65	69	80
	Wheat grain	0.1	0			96
			365	86, 84	85	96
			602	68, 72	70	98
			871	67, 67	67	- ^a
	Wheat forage	0.1	0			106
			365	68, 78	73	78
			874	86, 80	83	93
	Wheat hay	0.1	0			85
			368	81, 87	84	85
			881	73, 103	88	88
Wheat straw	0.1	0			104	
		369	89, 82	86	80	
		881	87, 87	87	86	
Almond nutmeat	0.1	0			100	
		213	95, 90	92	98	
		370	80, 84	82	88	
Almond hulls	0.5	0			82	
		78	83, 84	84	88	
Grape	0.1	0			84	
		368	90, 92	91	98	
Dried grape	0.1	0			109	
		210	87, 80	84	102	
		374	77, 81	79	99	
Orange oil	0.1	0	84, 98	91	91	
		210	87, 83	85	84	
		465	82, 85	84	82	
Orange juice	0.1	0			105	
		34	96, 97	96	92	
		211	104, 105	104	102	
BF9	Whole banana	0.1	0			85
			70	95, 93	94	95
	Potato tubers	0.1	0			98
			371	69, 75	72	94
			874	86, 90	88	88
Wheat grain	0.1	0			90	
		365	70, 67	68	79	
		602	61, 60	60	88	
		871	57, 57	57	94	
Wheat forage	0.1	0			96	
		365	59, 60	60	70	
		874	61, 67	64	84	
Wheat hay	0.1	0			85	
		368	67, 61	64	75	
		881	61, 61	61	88	
	Wheat straw	0.1	0			83
			369	51, 56	54	66
			881	40, 30	35	63
			896	29, 29	29	69

Analyte	Commodity	Fortification mg/kg	Storage days	% Remaining		Mean concurrent recovery, %	
				Individual results	Mean		
	Almond nutmeat	0.1	0			88	
			213	68, 75	72	86	
			370	73, 64	68	84	
	Almond hulls	0.5	0			74	
			78	76, 73	74	73	
Grape	0.1	0			80		
			368	76, 84	80	99	
Orange juice	0.1	0				104	
			34	91, 91	91	96	
			211	108, 100	104	97	
BF12	Whole banana	0.1	0			88	
			70	81, 83	82	86	
	Potato tubers	0.1	0				94
				371	76, 73	74	86
				874	80, 87	84	78
	Wheat grain	0.1	0				76
				365	41, 40	40	88
				602	32, 27	30	72
				871	22, 19	20	-a
	Wheat forage	0.1	0				88
				365	61, 73	67	72
				874	66, 67	66	76
	Wheat hay	0.1	0				95
				368	100, 90	95	80
				881	71, 78	74	74
	Wheat straw	0.1	0				100
369				59, 59	59	74	
881				57, 51	54	91	
Almond nutmeat	0.1	0				83	
			213	76, 76	76	85	
			370	74, 70	72	75	
Almond hulls	0.5	0				84	
			78	69, 69	69	76	
Grape	0.1	0				80	
			368	81, 76	78	96	
Grape juice	0.1	0				99	
			210	95, 91	93	90	
			366	80, 66	73	84	
Orange juice	0.1	0				86	
			34	82, 85	84	84	
			211	98, 101	100	94	
Milk	0.1	0				82	
			210	93, 91	92	96	
			365	89, 87	88	85	
BF23	Milk	0.1	0			82	
			211	85, 63	74	75	
			366	63, 77	70	71	

^a Error in the procedure. No reliable result.

USE PATTERN

The Meeting received information on use pattern in the USA. Table 2 shows use pattern related to those crops on which supervised trials were conducted in the USA.

Table 2 Registered uses of buprofezin in the USA related to supervised residue trials submitted

Crop	Form g ai/L or kg	Method	Rate kg ai/ha	Number	Min, interval days	PHI days
Almond	700 WG	Foliar	1.69-2.26	1		60
Apple	700 WG	Foliar	0.44-1.69	1		14
Avocado	700 WG	Foliar	0.44-1.69	2	14	21
Coffee	700 WG	Foliar	1.12	4	14	0
Cucurbits ^a	400 SC	Foliar	0.28-0.43	4	7	7 ^c
Fruiting vegetables, other than cucurbits	400 SC	Foliar	0.28-0.43	2	5	1
Grapes	700 WG	Foliar	0.44-0.59	2	14	7
Guava	700 WG	Foliar	0.44-1.69	2	14	21
Low-growing berries ^b	400 SC	Foliar	0.28-0.38	2	10	3
Lychee	700 WG	Foliar	1.69	2	14	21
Olive	700 WG	Foliar	1.69-2.26	2	50	21
Papaya	700 WG	Foliar	0.44-0.59	5	14	3
Pear & oriental pear	700 WG	Foliar	1.69-2.26	2 ^d	7	14
Snap beans	400 SC	Foliar	0.28-0.43	2	14	14
Stone fruits	700 WG	Foliar	1.69-2.26	2 ^d	14	14

^a Including cucumbers, melons, pumpkins and squash.

^b Including strawberry, bearberry, bilberry, low bush blueberry, cloudberry, cranberry, lingonberry, muntries and partridge berry.

^c 10 days in California in cucurbits other than cucumber.

^d Do not apply more than 3.37 kg ai/ha per year.

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The Meeting received data on supervised field trials of foliar application of for the following crops:

Commodity	Crop Group	Table No.
Apple	Pome fruits:	Table 3
Pear	Pome fruits	Table 4
Peach	Stone fruits	Table 5
Plum	Stone fruits	Table 6
Cherry	Stone fruits	Table 7
Grapes	Berries and other small fruits	Table 8
Strawberry	Berries and other small fruits	Table 9
Olive	Assorted tropical and sub-tropical fruit-edible peel	Table 10
Lychee	Assorted tropical and sub-tropical fruit-inedible peel	Table 11
Avocado	Assorted tropical and sub-tropical fruit-inedible peel	Table 12
Guava	Assorted tropical and sub-tropical fruit-inedible peel	Table 13
Papaya	Assorted tropical and sub-tropical fruit-inedible peel	Table 14

Commodity	Crop Group	Table No.
Cucumber	Fruiting vegetables, Cucurbits	Table 15
Cantaloupe	Fruiting vegetables, Cucurbits	Table 16
Summer squash	Fruiting vegetables, Cucurbits	Table 17
Tomato	Fruiting vegetables, other than Cucurbits	Table 18
Peppers	Fruiting vegetables, other than Cucurbits	Table 19
Common bean (pods and/or immature seeds)	Legume vegetables	Table 20
Almond	Tree nuts	Table 21
Coffee	Seed for beverages and sweets	Table 22
Almond hulls	Byproducts, used for animal feeding purposes, derived from fruit and vegetable processing	Table 23

All supervised trials reported from the USA were conducted outdoor with foliar applications.

Application rates were reported as buprofezin. Residue concentrations were reported for buprofezin and in some cases for two metabolites: reverse Schiff base (BF9) and isopropylphenylurea (BF12). Unquantifiable residues are shown as < LOQ. Residues below 1 mg/kg, application rates below 1 kg ai/ha and spray concentrations have been rounded to two significant figures. Residue concentrations are recorded unadjusted for recoveries or for residue values in control samples. Where multiple samples were taken from a single plot, individual results are reported, among which the highest result is used for estimation of maximum residue level. Where trials were conducted in the same location, with the same varieties, same or similar formulations, and same equipment, and at the same or similar timing, they are not regarded as independent and only one result from these trials was chosen for the estimation of a maximum residue level.

Residues from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels and they are underlined.

Pome fruits

The current Meeting received data on supervised field trials conducted in the USA on apple and pear as summarized in Tables 3 and 4.

A total of 14 supervised field trials on apple were conducted in the USA in 2000 and 2001 (Willard, 2001 and Stewart, 2002). In the trials conducted in 2000, each treated plot received one foliar application of the 70WP formulation at a rate of 1.67–1.71 kg ai/ha except in one trial at an exaggerated rate of 3.38 kg ai/ha for a processing study. The time from sampling to analysis was 70 days or shorter. Analyses were performed using the AgroEvo Method No. BF/02/96 (GC-NPD method). The LOQ of the method was 0.10 mg/kg. The percent recovery was 81–92%. The residues in control plots were all below the LOQ.

In one trial conducted in 2001, the treated plot received one foliar application of the 70WP formulation at a rate of 1.68 kg ai/ha. Samples were taken on 0, 20, 25, 30, 35 and 40 days after the application. The time from sampling to analysis ranged between 31 and 244 days. Analyses were performed using AgroEvo Method No. BF/10/97 (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The average percent recovery was 80%. Buprofezin was demonstrated to be stable when stored frozen up to the longest storage period of trial samples.

A total of seven supervised field trials on pears including oriental pears were conducted in the USA in 2001 (Samoil, 2004). Each treated plot received two foliar applications of the 70WP

formulation at a rate of 1.70–2.02 kg ai/ha. The treatment interval was 6–8 days. The time from sampling to analysis was 123 days or shorter. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The average percent recovery was 101%. The residues in control plots were all below the LOQ. Buprofezin was demonstrated to be stable when stored frozen up to the longest storage period of trial samples

Table 3 Buprofezin residues in apple from supervised trials in the USA

APPLE	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no.
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		1.69			1	14		
Ephrata, WA, 2000 (Red Delicious)	WP	1.68	0.18	954	1	0 20 25 30 35 40	0.36, 0.62 0.38, 0.35 0.25, 0.31 0.21, 0.30 0.24, 0.17 0.19, 0.11	R-1116 WA
Dundee, NY, 2001 (Macoun)	WP	1.70	0.18	944	1	14	<u>0.58</u> , 0.54	R-1113 NY1
Alton, NY, 2001 (Golden Delicious)	WP	1.69	0.23	752	1	14	0.87, <u>0.99</u>	R-1113 NY2
Bechtelsville, PA, 2001 (Red Delicious)	WP	1.68	0.18	918	1	14	<u>0.55</u> , 0.37	R-1113 PA1
Rochelle, GA, 2001 (Myra Red Fuji)	WP	1.68	0.17	1008	1	14	0.15, <u>0.18</u>	R-1113 GA1
Sturgeon Bay, WI, 2001 (Jonamac)	WP	1.71	0.062	2762	1	14	<u>0.15</u> , 0.15	R-1113 WI1
Lexington, MO, 2001 (Arkansas Gold Steller)	WP	1.68	0.21	790	1	14	< 0.10, < <u>0.10</u>	R-1113 MO1
North Logan, UT, 2001 (Red Delicious)	WP	1.69	0.082	2055	1	14	0.62, <u>0.75</u>	R-1113 UT1
Madera, CA, 2001 (Fuji)	WP	1.70	0.090	1891	1	14	<u>0.32</u> , 0.20	R-1113 CA1
Hood River, OR, 2001 (Jonagold)	WP	1.70	0.13	1290	1	14	< 0.10, < <u>0.10</u>	R-1113 OR1
Nampa, ID, 2001 (Red Delicious)	WP	1.67	0.061	2734	1	15	<u>0.24</u> , 0.22	R-1113 ID1
Fruitland, ID, 2001 (Red Delicious)	WP	1.68	0.14	1165	1	14	<u>0.85</u> , 0.68	R-1113 ID2
Ephrata, WA, 2001 (Red Beauty)	WP	1.68	0.14	1169	1	15	<u>0.11</u> , 0.10	R-1113 WA1
Alton, NY, 2001 (Golden Delicious)	WP	3.38	0.45	752	1	14	2.07	R-1113 NY2

Table 4 Buprofezin residues in pear from supervised trials in the USA

PEAR	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		2.26			2	14		
		Not more than 3.37 kg ai/ha per year						
Parlier, CA, 2001 (Shinsui)	WP	1.82 1.82	0.11 0.11	1673 1673	2	14	0.57, <u>0.60</u>	R-1169 07518.01-CA64

PEAR	Form	Application				PHI, days	Residues, mg/kg	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	
Bellota, CA, 2001 (Bartlett)	WP	2.02	0.19	1056	2	14	0.31, <u>0.40</u>	R-1169 07518.01-CA94
		1.78	0.17	1056				
Porterville, CA, 2001 (Bosc)	WP	1.78	0.19	926	2	14	0.81, <u>1.11</u>	R-1169 07518.01-CA95
		1.76	0.19	926				
Hotchkiss, CO, 2001, (Bartlett)	WP	1.70	0.10	1655	2	13	<u>1.09</u> , 0.71	R-1169 07518.01-CO14
		1.72	0.10	1673				
Buhl, ID, 2001 (Bartlett)	WP	1.76	0.25	701	2	13	2.70, <u>3.64</u>	R-1169 07518.01-ID13
		1.77	0.25	701				
Bridgeton, NJ, 2001 (Shinseiki)	WP	1.86	0.20	944	2	13	0.71, <u>0.86</u>	R-1169 07518.01-NJ22
		1.76	0.19	935				
Prosser, WA, 2001 (Bartlett)	WP	1.77	0.23	785	2	15	0.68, 0.60	R-1169 07518.01-WA28 07518.01-WA29
		1.81	0.18	1010				
	WP	1.76	0.17	1028	2	13	<u>1.31</u> , 1.12	
		1.81	0.17	1038				

Stone fruits

The current Meeting received data of supervised field trials conducted in the USA on peach (2000, 2001), plum (2002) and cherry (2002) and that in Italy on cherry (2001) as summarized in Tables 5, 6 and 7.

A total of 12 supervised field trials on peach were conducted in the USA in 2001 (Samoil, 2003). Each treated plot received two foliar applications of the 70WP formulation at a rate of 1.70–1.81 kg ai/ha except two trials. Among these two trials, in one trial, buprofezin was applied three times at rates of 0.16, 1.61 and 1.59 kg ai/ha in this order. In the other trial, buprofezin was applied four times at rates between 1.76 and 1.79 kg ai/ha. The treatment interval of the 12 trials was 13–15 days. The time from sampling to analysis was 419 days or shorter. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.04 mg/kg and LOD 0.01 mg/kg. The average percent recovery was 87%. The residues in control plots were all below the LOQ. Buprofezin was demonstrated to be stable when stored frozen up to the longest storage period of trial samples

A total of six supervised field trials on plums were conducted in the USA in 2002 (Samoil, 2005). Each treated plot received two foliar applications of the 70WP formulation at a rate of 1.77–1.79 kg ai/ha. The treatment interval was 14–15 days. The time from sampling to analysis ranged from 309 to 353 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.042 mg/kg and LOD 0.014 mg/kg. The average percent recovery was 86%. The residues in control plots were all below the LOQ. Buprofezin was demonstrated to be stable when stored frozen up to the longest storage period of trial samples.

A total of ten independent supervised field trials on cherries, tart and sweet, were conducted in the USA in 2002 and 2003 (Samoil, 2005). Each treated plot received one foliar application of the 70WP formulation at a rate of 1.73–1.87 kg ai/ha. The treatment interval was 13–15 days. The time from sampling to analysis ranged from 148 to 484 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The average percent recovery was 84%. Buprofezin was demonstrated to be stable when stored frozen up to the longest storage period of trial samples

The Meeting also received data of supervised trials conducted in Italy on cherry. Supervised field trials were conducted in two locations Italy in 2001 (Domenichini, 2003). Each treated plot received one foliar application of the 25WP or 40SC formulation at a rate of 0.51–0.52 kg ai/ha. The time from sampling to analysis was up to 252 days. Analyses were performed using a GC-NPD method. The LOQ of the method was 0.01 mg/kg.

Table 5 Buprofezin residues in peach from supervised trials in the USA

PEACH Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max) for stone fruits		2.26			2	14		
		Not more than 3.37 kg ai/ha per year						
Parlier, CA, 2000 (Fay Elberta)	WP	1.78 1.78	0.12 0.12	1449 1449	2	14	<u>0.89</u> , 0.72	R-1168 07517.00-CA87
Fresno, CA, 2000 (Flavorcrest)	WP	1.76 1.75	0.095 0.095	1860 1851	2	14	<u>0.84</u> , 0.80	R-1168 07517.00-CA119
Crossville, TN, 2000 (unknown)	WP	1.77 1.81	0.15 0.16	1141 1131	2	13	0.11, <u>0.12</u>	R-1168 07517.00TN08
Parlier, CA, 2001 (Flavorcrest)	WP	1.81 1.81	0.12 0.13	1468 1449	2	15	<u>1.40</u> , 1.16	R-1168 07517.01-CA63
Madera, CA, 2001 (Chance)	WP	1.74 1.77	0.19 0.19	916 935	2	14	1.18, <u>1.77</u>	R-1168 07517.01-CA78
Citra, FL, 2001 (Tropic Beauty)	WP	0.16 1.61 1.59	0.015 0.14 0.14	1215 1253 1234	3	14	5.58, <u>8.13</u>	R-1168 07517.01-FL39
Fennville, MI, 2001 (Elberta)	WP	1.76 1.74	0.19 0.19	925 916	2	14	2.20, <u>2.36</u>	R-1168 07517.01-MI26
Jackson Springs, NC, 2001 (Emery)	WP	1.77 1.78	0.35 0.34	514 524	2	13	<u>1.31</u> , 0.90	R-1168 07517.01-NC17
Jackson Springs, NC, 2001 (Contender)	WP	1.70 1.75	0.31 0.31	542 561	2	12	0.34, <u>0.45</u>	R-1168 07517.01-NC18
Bridgeton, NJ, 2001 (Dixie Red)	WP	1.77 1.82	0.19 0.19	935 954	2	15	0.25, <u>0.40</u>	R-1168 07517.01-NJ21
Lansing, NY, 2001 (Horcrest Lovell)	WP	1.77 1.76 1.79 1.76	0.38 0.38 0.38 0.38	467 467 477 467	4	13	2.30, <u>3.11</u>	R-1168 07517.01-NY19
Devine, TX, 2001 (Tex Royal)	WP	1.77 1.77	0.33 0.36	533 495	2	14	<u>2.20</u> , 1.66	R-1168 07517.01-TX25

Table 6 Buprofezin residues in plum from supervised trials in the USA

PLUM Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max) for stone fruits		2.26			2	14		
		Not more than 3.37 kg ai/ha per growing season						
Woodlake, CA, 2002 (Angeleno)	WP	1.77 1.77	0.11 0.12	1552 1524	2	14	<u>0.05</u> , 0.05	R-1170 CA82
Parlier, CA, 2002 (Casselman)	WP	1.79 1.78	0.11 0.11	1664 1683	2	14	<u>0.08</u> , 0.06	R-1170 CA83
Parlier, CA, 2002 (Friar)	WP	1.79 1.79	0.13 0.12	1430 1440	2	14	<u>0.23</u> , 0.22	R-1170 CA84
Kerman, CA, 2002 (French)	WP	1.77 1.77	0.15 0.15	1169 1169	2	14	<u>0.26</u> , 0.24	R-1170 CA85
Fennville, MI, 2002 (Early Golden)	WP	1.77 1.77	0.19 0.19	935 935	2	14	0.44, <u>0.55</u>	R-1170 MI8
Brooks, OR, 2002 (Brooks)	WP	1.78 1.79	0.20 0.21	869 869	2	13	0.08, <u>0.08</u>	R-1170 OR18

Table 7 Buprofezin residues in cherry from supervised trials in Italy and the USA

CHERRY Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max) for stone fruits		2.26			2	14				
		Not more than 3.37 kg ai/ha per growing season								
Modena, Italy, 2001 (Celeste)	WP	0.49	0.033	1564	1	0	0.52	< 0.01	< 0.01	R-1179 BU2/I/09CL
						1	0.19	< 0.01	< 0.01	
						3	0.10	< 0.01	< 0.01	
						7	0.06	< 0.01	< 0.01	
	SC	0.50	0.033	1573	1	0	0.71	< 0.01	< 0.01	
						1	0.32	< 0.01	< 0.01	
						3	0.32	< 0.01	< 0.01	
						7	0.16	< 0.01	< 0.01	
Verona, Italy, 2001 (Van)	WP	0.52	0.033	1539	1	14	0.12	< 0.01	< 0.01	R-1179 BU2/I/10CL
	SC	0.50	0.033	1550	1	14	0.20	< 0.01	< 0.01	
Madera, CA, 2002 (sweet cherry: Tulare)	WP	1.75	0.13	1386	2	13	1.00, 0.59			R-1166 07250.02- CA80
		1.77	0.13	1409						
Visalia, CA, 2002 (sweet cherry: Kings)	WP	1.79	0.098	1827	2	13	1.32, 1.31			R-1166 07250.02- CA81
		1.79	0.099	1808						
Hotchkiss, CO, 2002 (tart cherry: Montmorency)	WP	1.82	0.16	1128	2	13	0.44, 0.45			R-1166 07250.02- CO08
		1.87	0.16	1157						
Homedale, ID, 2002 (sweet cherry: Lambert)	WP	1.76	0.126	1399	2	14	0.46, 0.45			R-1166 07250.02- ID08
		1.77	0.126	1406						
Fennville, MI, 2002 (tart cherry: Montmorency)	WP	1.74	0.189	919	2	12	0.44, 0.51			R-1166 07250.02- MI16
		1.73	0.189	917						
	WP	1.78	0.19	943	2	13	1.13, 1.20			07250.02- MI17
		1.76	0.19	931						
Bridgeton, NJ, 2002 (tart cherry: North Star)	WP	1.73	0.17	992	2	14	0.31, 0.30			R-1166 07250.02- NJ23
		1.76	0.17	1037						
Prosser, WA, 2002 (sweet cherry: Bing)	WP	1.79	0.12	1535	2	14	0.57, 0.57			R-1166 07250.02- WA25
		1.77	0.12	1428						
Prosser, WA, 2002 (tart cherry: Montmorency)	WP	1.79	0.20	897	2	12	0.50, 0.54			R-1166 07250.02- WA26
		1.77	0.23	763						
Fennville, MI, 2003 (sweet cherry: Hedelfingen)	WP	1.79	0.19	947	2	14	0.96, 1.01			R-1166 07250.03- MI03
		1.81	0.19	959						
	WP	1.78	0.19	943	2	14	0.62, 0.69			07250.03- MI04
		1.76	0.19	933						
Fennville, MI, 2003 (tart cherry: Montmorency)	WP	1.76	0.19	930	2	14	0.45, 0.57			R-1166 07250.03- MI05
		1.73	0.19	916						
	WP	1.76	0.19	931	2	14	0.89, 0.79			07250.03- MI06
		1.76	0.19	930						

Berries and other small fruits

The Meeting received information on supervised residue trials conducted in the USA on grapes and strawberry as summarized in Tables 8 and 9. Grape trials reported in R-1164 had been submitted to the 2008 JMPR but the JMPR concluded that they did not match US GAP.

A total of 13 supervised field trials on grapes were conducted in the USA in 2003, 2004 and 2008 (Carringer, 2004, 2005 and 2009). A treated plot in the 2003 study received two foliar applications of the 70WP formulation at the rate of 0.56 kg ai/ha with the treatment interval of 14 days. Duplicate samples were taken 3, 7, 14, 21 and 30 days after the second application and analysed using AgroEvo Method No. BF/05/94 with modification (GC-NPD method). The LOQ was 0.01 mg/kg and the average percent recovery was 102% for buprofezin, 96% for BF9 and 83% for BF12.

In the 2004 study, each treated plot received two applications of the 70WP formulation at the rate of 0.56 kg ai/ha with the treatment interval of 14 days. The time from sampling to analysis ranged from 18 to 66 days. Analysis was conducted using AgroEvo Method No. BF/05/94 with modification (GC-NPD method). The LOQ was 0.01 mg/kg and the average percent recovery was 97% for buprofezin, 88% for BF9 and 86% for BF12.

In the 2008 study, each treated plot received two foliar applications of the 70WG formulation at a rate of 0.52–0.56 kg ai/ha. The treatment interval was 13–15 days. The time from sampling to analysis was 117 days or shorter. Analyses were performed using AgroEvo Method No. BF/05/94 with modification (GC-NPD method). The LOQ of the method was 0.01 mg/kg and the average percent recovery was 96% for buprofezin, 98% for BF9 and 89% for BF1.

A total of nine supervised field trials on strawberry were conducted in the USA in 2003 except one in Florida was conducted in 2004 (Samoil, 2006). Each treated plot received two foliar applications of the 40SC formulation at a rate of 0.38–0.40 kg ai/ha. The treatment interval was 6–10 days, but mostly 7 days. The time from sampling to analysis ranged from 46 to 276 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.017 mg/kg. The percent recovery ranged from 66 to 102%. The residues in control plots were all below the LOQ. Berries were analysed.

Table 8 Buprofezin residues in grapes from supervised trials in the USA (Carringer, 2004, 2005 and 2009)

GRAPES Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		0.59			2	7				
Tulare, CA, 2003 (Emperor's)	WP	0.56	0.061	918 910	2	3 7 14 21 30	0.23, 0.15 0.14, 0.13 0.11, 0.08 0.07, 0.05 0.03, 0.06			TCI-03-082
Williamson, NY, 2004 (Cayuga White)	WP	0.56	0.100	547 565	2	7	0.39, 0.30	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-01
Dundee, NY, 2004 (Concord)	WP	0.56	0.060	935 935	2	7	0.38, 0.35	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-02
Tulare, CA, 2004 (Thompson Seedless)	WP	0.56	0.091 0.088	623 642	2	7	0.05, 0.05	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-03
Delano, CA, 2004 (Ruby Seedless)	WP	0.56	0.053 0.053	1056 1066	2	7	0.09, 0.14	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-04
Kingsburg, CA, 2004 (Crimson)	WP	0.54 0.56	0.095 0.095	569 590	2	7	0.04, 0.04	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-05
San Ardo, CA,	WP	0.56	0.042	1328	2	7	0.68, 0.74	< 0.01	< 0.01	R-1164

GRAPES Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
2004 (Cabernet sauvignon)			0.041	1374				< 0.01	< 0.01	TCI-04-088-06
Gerge Quincy, WA 2004 (Cabernet sauvignon)	WP	0.56	0.098 0.098	569 572	2	7	0.36, <u>0.55</u>	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-07
Ephrata, WA, 2004 (Cabernet sauvignon)	WP	0.56	0.040 0.040	1402 1393	2	7	0.17, <u>0.28</u>	< 0.01 < 0.01	< 0.01 < 0.01	R-1164 TCI-04-088-08
Kingsburg, CA, 2008 (Crimson)	WG	0.56			2	7	<u>0.09</u> , 0.08	< 0.01 < 0.01	< 0.01 < 0.01	TCI-08-220 -01
Richgrove, CA, 2008 (Muscat)	WG	0.52			2	6	0.15, <u>0.18</u>	< 0.01 < 0.01	< 0.01 < 0.01	TCI-08-220 -02
Poplar, CA, 2008 (Thompson seedless)	WG	0.54			2	7	0.15, <u>0.17</u>	< 0.01 < 0.01	< 0.01 < 0.01	TCI-08-220 -03
Kingsburg, CA, 2008 (Crimson)	WG	0.52			2	7	<u>0.13</u> , 0.13	< 0.01 < 0.01	< 0.01 < 0.01	TCI-08-220 -04

Table 9 Buprofezin residues in strawberry from supervised trials in the USA

STRAWBERRY Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg		Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin		
US GAP (max)		0.38			2	3			
Salinas, CA, 2003 (Diamante)	SC	0.39 0.38	0.046 0.036	832 1056	2 ^a	1 4 7 10	1.15, 1.35 0.85, 0.85 0.57, 0.80 0.33, 0.34	R-1185 08737.03-CA*66	
Watsonville, CA, 2003 (Camarosa)	SC	0.40 0.40	0.035 0.036	1122 1113	2 ^b	2	0.60, 0.41	R-1185 08737.03-CA*67	
Madera, CA, 2003 (Quinalt)	SC	0.38 0.38	0.045 0.046	841 832	2 ^a	3	1.08, 1.24	R-1185 08737.03-CA68	
Lyon, GA, 2003 (Camarosa)	SC	0.39 0.39 ^a	0.045 0.045	851 860	2	3	0.10, <u>0.15</u>	R-1185 08737.03-GA*12	
Clinton, NC, 2003 (Chandler)	SC	0.39 0.38	0.050 0.050	785 767	2 ^a	4	0.09, 0.09	R-1185 08737.03-NC11	
Bridgeton, NJ, 2003 (Chandler)	SC	0.38 0.39	0.051 0.052	748 757	2 ^a	4	0.35, 0.39	R-1185 08737.03-NJ14	
Aurora, OR, 2003 (Totem)	SC	0.40 0.39	0.047 0.047	851 841	2 ^a	2	0.44, 0.43	R-1185 08737.03-OR10	
Greenwood, WI, 2003 (Burnswick)	SC	0.39 0.39	0.044 0.043	879 897	2 ^b	3	0.37, 0.41	R-1185 08737.03-WI11	
Dover, FL, 2004 (Festival)	SC	0.38 0.38	0.046 0.045	823 841	2 ^a	1 3 7 10	0.48, 0.52 0.55, 0.40 0.26, 0.32 0.25, 0.27	R-1185 08737.04-FL48	

^a The interval between the two applications was 7 days.

^b The interval between the two applications was 6 days.

Assorted tropical and sub-tropical fruit-edible peel

The Meeting received information on supervised residue trials conducted in the USA on olive as summarized in Table 10.

A total of four supervised field trials on olive were conducted in the USA in 2004 (Samoil, 2006). Each treated plot received two foliar applications of the 70WP formulation at a rate of 2.37–2.44 kg ai/ha. In one of the locations, buprofezin was applied at exaggerated rates of 12.09 and 12.14 kg ai/ha for studying effects of processing. The treatment interval was 4951 days. The time from sampling to analysis ranged from 184 to 238 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.033 mg/kg. The percent recovery ranged from 81 to 98%. The residues in control plots were all below the LOQ.

Table 10 Buprofezin residues in olive from supervised trials in the USA

OLIVE	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		2.26			2	21		
Orange Cove, CA, 2004 (Manzanillo)	WP	2.44 2.42	0.18 0.17	1393 1402	2	21	<u>0.56</u> , 0.41	R-1186 09015.04-CA46
Porterville, CA, 2004 (Sevillana)	WP	2.38 2.37	0.21 0.19	1113 1225	2	21	1.09, <u>1.10</u>	R-1186 09015.04-CA47
Corning, CA, 2004 (Manzanillo)	WP	2.39 2.39	0.23 0.23	1038 1038	2	22	<u>1.15</u> , 1.07	R-1186 09015.04-CA48
Davis, CA, 2004 (Manzanillo)	WP	2.39 2.38	0.23 0.23	1066 1056	2	23	1.54, <u>1.66</u>	R-1186 09015.04-CA49
Orange Cove, CA, 2004 (Manzillo)	WP	12.14 12.09	0.87 0.86	1393 1402	2	21	10.16	R-1186 09015.04-CA46

Assorted tropical and sub-tropical fruit-inedible peel

The Meeting received information on supervised residue trials conducted in the USA on lychee, avocado, guava and papaya as summarized in Tables 11–14.

A total of two independent supervised field trials on lychee were conducted in the USA in 2000 (Samoil, 2001). In the trial on Mauritius variety, treated plot received two foliar applications of the 70WP formulation at a rate of 1.76–1.78 kg ai/ha. The treatment interval was 12 days. In the other trial on Brewster variety, 70WP formulation was applied three times at 1.72–1.75 kg ai/ha with the intervals of 16 and 21 days. The time from sampling to analysis was 151 days or shorter. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.02 mg/kg. The average percent recovery was 96%. The residues in control plots were all below the LOQ.

A total of four supervised field trials on avocado were conducted in the USA in 2000 (Samoil, 2003). Each treated plot received one foliar application of the 70WP formulation at a rate of 1.70–1.91 kg ai/ha. The treatment interval was 63, 13 and 1 (on Peterson); 77 and 15 (on Booth); 124 and 15 (on Lula); and 12 (on Simon) days. In the trials on Booth and Lula, application was made three times as the first application was made too early. In the trial on Peterson, application was made four times, as the first application was made too early and immediately after the third application there was heavy rain. The time from sampling to analysis was up to 204 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was determined statistically but the lowest level in the method calibration was 0.02 mg/kg. The average percent recovery was 89%. The residues in control plots were all below the LOQ.

Supervised field trials on guava were conducted in one location in the USA in 2003 with the harvest in July and September (Mahnken, 2005). No information was available on the variety(ies) of guava in the trials. Each treated plot received two foliar applications of the 70WP formulation at a rate of 1.77 kg ai/ha. No other details of field treatment were available than the last application. The time from sampling to analysis was up to 167 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.024 mg/kg.

A supervised field trial on *papaya* was conducted in one location using the same variety in the USA in 2002 (Samoil, 2005). Each treated plot received five foliar applications of the 70WP formulation at a rate of 0.42–0.47 kg ai/ha. The treatment interval was 7–15 days (details shown in Table 14). The time from sampling to analysis ranged from 43 to 91 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.022 mg/kg. The percent recovery ranged from 82 to 90%.

Table 11 Buprofezin residues in lychee from supervised trials in the USA

LYCHEE	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		1.69			2	21		
Homestead, FL, 2000 (Mauritius)	WP	1.78 1.78	0.25 0.25	701 701	2	23	<u>0.26</u> , 0.13	R-1172 07739.00-FL17
	WP	1.76 1.76	0.15 0.15	1206 1206	2	23	0.04, 0.15	07739.00-FL18
Homestead, FL, 2000 (Brewster) ^a	WP	1.72	0.15	1178	3	14	0.24, 0.11	R-1172 07739.00-FL19
		1.73	0.15	1187				
		1.75	0.15	1206				

^a The intervals between applications were 16 and 21 days.

Table 12 Buprofezin residues in avocado from supervised trials in the USA

AVOCADO	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		1.69			2	21		
Homestead, FL, 2000 (Peterson)	WP	1.76	0.095	1851	4	21	0.03, 0.01	R-1173 07740.00-FL20
		1.81	0.095	1907				
		1.87	0.095	1973				
		1.84	0.095	1935				
Homestead, FL, 2000 (Booth)	WP	1.86	0.15	1281	3	21	0.12, 0.04	R-1173 07740.00-FL21
		1.91	0.15	1309				
		1.90	0.15	1300				
Homestead, FL, 2000 (Lula)	WP	1.75	0.15	1206	3	23	0.01, 0.01	R-1173 07740.00-FL22
		1.85	0.15	1263				
		1.82	0.15	1243				
Santa Isabel, Puerto Rico, 2000 (Simmons)	WP	1.76	0.20	869	2	23	0.16, <u>0.23</u>	R-1173 07740.00-PR04
		1.70	0.20	841				

Table 13 Buprofezin residues in guava from supervised trials in the USA

GUAVA	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		1.69			2	21		
Homestead, FL, 2003 (unknown) ^a	WP	1.77			2	13	0.15, 0.27	07403.03-FL31
Homestead, FL, 2003 (unknown) ^a	WP	1.77			2	14	0.08, 0.10	07403.03-FL32
Homestead, FL, 2003 (unknown) ^b	WP	1.77			2	9	< 0.05, < 0.05	07403.03-FL33

^a Last application and harvest in July

^b Last application and harvest in September

Table 14 Buprofezin residues in papaya from supervised trials in the USA

PAPAYA Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no	
		kg ai/ha	kg ai/hL	Water, L/ha	No.				
US GAP (max)		0.59			5	3			
Homestead, FL, 2002 (Red Lady) Interval: 14, 14, 14, 15	WP	0.43	0.026		5	3	0.43, 0.56	R-1165 07024.02-FL32	
		0.47	0.026						
		0.44	0.026						
		0.44	0.026						
		0.44	0.026						
	WP	0.44	0.026		5	2	0.64, <u>0.62</u>		07024.02-FL33
		0.44	0.026						
		0.44	0.026						
		0.45	0.026						
		0.43	0.026						
Florida City, FL, 2002 (Red Lady) Interval: 7, 8, 13, 14	WP	0.42	0.026		5	3	0.68, 0.62	R-1165 07024.02-FL34	
		0.42	0.026						
		0.42	0.026						
		0.42	0.026						
		0.42	0.026						

Fruiting vegetables, Cucurbits

The Meeting received information on supervised residue trials conducted in the USA on cucumber, cantaloupe and summer squash as summarized in Tables 15–17.

A total of 17 supervised field trials on cucumbers (six on cucumber for fresh consumption and 11 on cucumbers for pickling) were conducted in the USA in 1994 (Neal, 1997). Each treated plot received four foliar applications of the 40 SC formulation at a rate of 0.39–0.45 kg ai/ha, except in one trial that last application was at 0.71 kg ai /ha. The treatment interval was 4–9 days but mostly five days. Samples were collected 7, 10 and 14 days after the last application. The time from sampling to analysis was up to 779 days. Analyses were performed using AgroEvo Method No. BF/05/94 with modification (GC-NPD method). The LOQ of the method was 0.01 mg/kg. The average percent recovery was 93% for cucumber of fresh consumption and 94% for pickling cucumber. The residues in control plots were all below the LOQ.

The results of these trials were provided to the 2008 JMPR, which, after review, concluded that they were not in compliance with the US GAP because the interval between applications was mostly five days, two days shorter than the interval of seven days specified in the US GAP.

A total of 12 supervised field trials on cantaloupe were conducted in the USA in 1994 (Neal, 1996). Each treated plot received four foliar applications of the 40SC formulation at a rate of 0.41–0.47 kg ai/ha. The treatment interval was 47 days, but mostly five days. The time from sampling to analysis was up to 308 days. Analyses were performed using AgroEvo Method No. BF/06/94 with modification (GC-NPD method). The LOQ of the method was 0.01 mg/kg. The average percent recovery was 94% for buprofezin, 93% for BF9 and 80% for BF12. The residues in control plots were all below the LOQ.

A total of 12 supervised field trials on summer squash were conducted in the USA in 1994 (Neal, 1996). Each treated plot received one foliar application of the WP formulation at a rate of 1.67–1.70 kg ai/ha. The treatment interval was 4–9 days, but mostly five. The time from sampling to analysis was up to 371 days. Analyses were performed using AgroEvo Method No. BF/06/94 with modification (GC-NPD method). The LOQ of the method was 0.01 mg/kg. The average percent recovery was 94% for buprofezin, 93% for BF9 and 81% for BF1. The residues in control plots were all below the LOQ.

Table 15 Buprofezin residues in cucumber from supervised trials in the USA

CUCUMBER	Form	Application				PHI, days	Residues, mg/kg			Reference Trial site no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		0.43			4	7				
Cucumber for fresh consumption										
Molino, FL, 1994 (Marketmore 76)	SC	0.43 ^a	0.242	176	4 ^a	7 10 14	0.03 0.03 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03SFRS
Seven Springs, NC, 1994 (Marketmore 76)	SC	0.40 0.41 0.41 0.43	0.223 0.225 0.225 0.228	181 184 184 187	4	7 10 14	0.03 0.02 0.02	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JWS.02
Conklin, MI, 1994 (Marketmore 76)	SC	0.43 0.43 0.43 0.43	0.182 0.190 0.190 0.182	234 224 224 234	4	7 10 14	0.08 0.05 0.06	< 0.01 < 0.01 < 0.01	0.02 < 0.01 < 0.01	R-1073 BF-94R- 03JRS.01
Brookshire, TX, 1994 (Dasher II)	SC	0.43 0.43 0.43 0.43	0.225 0.226 0.223 0.227	189 188 191 193	4	7 10 14	< 0.01 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03GLS.02
Delavon, WI, 1994 (Marketmore)	SC	0.41 0.41 0.44 0.43	0.170 0.167 0.167 0.166	243 249 261 256	4	7 10 14	0.03 0.04 0.03	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JLB.02
Zellwood, FL, 1994 (Poinsett)	SC	0.43	0.228	187	4	7 10	0.19 0.20	< 0.01 < 0.01	< 0.01 < 0.01	R-1073 BF-94R- 03WKT.01
Cucumber for pickling										
Fresno, CA, 1994 (Calypso)	SC	0.41 0.41 0.41 0.41 0.41	0.153 0.154 0.154 0.153 0.153	272 269 269 270 272	5	7 10 14	0.02 0.02 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03FSCA
Kinston, NC, 1994 (National Pickle)	SC	0.43 0.42 0.43 0.43	0.227 0.224 0.227 0.227	188 185 188 188	4	7 10 14	0.02 0.02 0.02	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JWS.01
Fairmont, NC, 1994 (National Pickle)	SC	0.44 0.44 0.43 0.43	0.150 0.153 0.151 0.152	290 285 283 280	4	7 10 14	0.03 0.02 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JWS.05
Conklin, MI, 1994 (Calypso)	SC	0.43 0.43 0.43 0.43	0.199 0.190 0.182 0.190	214 224 234 224	4	7 10 14	0.03 0.03 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JRS.02
Brawley, CA, 1994 (Conquistador)	SC	0.41 0.43 0.44 0.43 0.43	0.091 0.089 0.089 0.091 0.091	455 477 488 468 469	4	7 10 14	0.09 0.04 0.04	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03PNO.01
Mason, MI, 1994 (Calypso)	SC	0.43 0.39 0.41 0.40	0.224 0.224 0.226 0.225	190 175 184 179	4	7 10 14	0.05 0.05 0.02	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JRS.03
Johnstown, WI, 1994 (Primepak)	SC	0.41 0.41 0.41 0.40	0.164 0.169 0.165 0.167	252 245 252 242	5	7 10 14	0.09 0.07 0.05	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	R-1073 BF-94R- 03JLB.01

CUCUMBER Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial site no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
Elko, SC, 1994 (Fancipak)	SC	0.42	0.183	227	4	7	0.03	< 0.01	< 0.01	R-1073 BF-94R- 03JWS.03
		0.43	0.182	234		10	0.02	< 0.01	< 0.01	
		0.41	0.180	230		14	0.02	< 0.01	< 0.01	
		0.44	0.188	233						
Elko, SC, 1994 (Calypso)	SC	0.43	0.280	152	4	7	0.03	< 0.01	< 0.01	R-1073 BF-94R- 03JWS 04
		0.41	0.184	226		10	0.02	< 0.01	< 0.01	
		0.43	0.186	228		14	< 0.01	< 0.01	< 0.01	
		0.44	0.187	234						
East Bernard, TX, 1994 (Straight Eight)	SC	0.43	0.228	187	4	7	0.02	< 0.01	< 0.01	R-1073 BF-94R- 03GLS.01
		0.43	0.228	187		10	0.02	< 0.01	< 0.01	
		0.43	0.217	196		14	0.01	< 0.01	< 0.01	
		0.71	0.307	230						
Hughson, CA, 1994 (Sumter)	SC	0.44	0.150	292	4	7	0.30	< 0.01	< 0.01	R-1073 BF-94R- 03MHE.02
		0.44	0.150	292		10	0.21	< 0.01	< 0.01	
		0.44	0.150	292		14	0.10	< 0.01	< 0.01	
		0.45	0.153	292						

^a The interval between the 3rd and 4th applications was 4 days.

Table 16 Buprofezin residues in cantaloupe from supervised trials in the USA

CANTALOUPE Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial site no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		0.43			4	7 10 (CA)				
Fresno, CA, 1994 (Topmark)	SC	0.41	0.153	270	4	7	0.41	< 0.01	< 0.01	R-1070 BF-94R-17 FSCA
						10	0.33	< 0.01	< 0.01	
						14	0.26	< 0.01	< 0.01	
Montezuma, GA, 1994 (Hales Best)	SC	0.41	0.22	188	4	7	0.19	< 0.01	< 0.01	R-1070 BF-94R-17 WKT.01
		0.41	0.22	188		10	0.15	< 0.01	< 0.01	
		0.41	0.22	188		14	0.11	< 0.01	< 0.01	
		0.47	0.22	214						
Maricopa, AZ, 1994 (Topmark)	SC	0.43	0.23	188	4	7	0.21	< 0.01	< 0.01	R-1070 BF-94R-17 PNO.01
						10	0.21	< 0.01	< 0.01	
						14	0.19	< 0.01	< 0.01	
Jamesville, NC, 1994 (Harpers Hybrid)	SC	0.43	0.16	264	4	7	0.18	< 0.01	< 0.01	R-1070 BF-94R-17 JWS.01
		0.41	0.15	274		10	0.19	< 0.01	< 0.01	
		0.43	0.16	266		14	0.09	< 0.01	< 0.01	
		0.43	0.16	274						
Brookshire, TX, 1994 (Tam- Uvalde)	SC	0.41	0.22	186	4	7	0.15	< 0.01	< 0.01	R-1070 BF-94R-17 GLS.01
		0.43	0.23	189		10	0.15	< 0.01	< 0.01	
		0.43	0.23	189		14	0.06	< 0.01	< 0.01	
		0.43	0.23	189						
Conklin, MI, 1994 (Superstar)	SC	0.43	0.19	224	4 ^a	7	0.17	< 0.01	< 0.01	R-1070 BF-94R-17 JRS.01
		0.43	0.19	224		10	0.19	< 0.01	< 0.01	
		0.43	0.19	229		14	0.16	0.01	< 0.01	
		0.41	0.19	219						
Reedly, CA, 1994 (Topmark)	SC	0.44	0.22	202	4	7	0.18	< 0.01	< 0.01	R-1070 BF-94R-17 DRC.01
		0.44	0.21	206		10	0.15	< 0.01	< 0.01	
		0.45	0.21	209		14	0.12	< 0.01	< 0.01	
		0.44	0.21	204						
New Holland, OH, 1994 (unknown)	SC	0.41	0.23	179	4	7	0.26	< 0.01	< 0.01	R-1070 BF-94R-17 JRS.03
		0.43	0.24	175		10	0.33	< 0.01	< 0.01	
		0.43	0.24	175		14	0.26	< 0.01	< 0.01	
		0.43	0.24	175						

CANTALOUPE Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial site no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
Baptistown, NJ, 1994 (Ball 1776)	SC	0.43	0.17	254	4	7	0.37	< 0.01	0.01	R-1070 BF-94R-17 DRS.02
		0.43	0.16	261		10	0.30	< 0.01	0.01	
		0.43	0.17	258		14	0.17	< 0.01	< 0.01	
		0.44	0.17	261						
Noblesville, IN, 1994 (Iroquois)	SC	0.43	0.23	187	4 ^a	7	0.18	< 0.01	< 0.01	R-1070 BF-94R-17 MJM.01
		0.43	0.21	206		10	0.15	< 0.01	< 0.01	
		0.43	0.21	203		14	0.10	< 0.01	< 0.01	
		0.43	0.21	206						
Cory, CO, 1994 (Mission Hybrid)	SC	0.43	0.15	286	4	7	0.16	< 0.01	< 0.01	R-1070 BF-94R-17 MDA.01
		0.41	0.15	275		10	0.06	< 0.01	< 0.01	
		0.41	0.15	274		14	0.08	< 0.01	< 0.01	
		0.41	0.15	277						
Donna, TX, 1994 (PMR-45)	SC	0.41	0.23	184	4	7	0.20	< 0.01	0.01	R-1070 BF-94R-17 GLS.02
		0.44	0.23	191		10	0.12	< 0.01	< 0.01	
		0.46	0.23	203		14	0.09	< 0.01	< 0.01	
		0.43	0.23	186						

^a The interval between the 3rd and 4th applications was 4 days.

Table 17 Buprofezin residues in summer squash from supervised trials in the USA

SUMMER SQUASH Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		0.43			4	7 10 (CA)				
Fresno, CA, 1994 (Bennings)	SC	0.41	0.15	270	4	7	0.05	< 0.01	< 0.01	R-1070 BF-94R- 17WFRS
		0.41	0.15	270		10	0.04	< 0.01	< 0.01	
		0.43	0.16	274		14	0.02	< 0.01	< 0.01	
		0.43	0.16	274						
Molino, CA, 1994 (Yellow Crookneck)	SC	0.43	0.24	175	4 ^a	7	0.03	< 0.01	< 0.01	R-1070 BF-94R-17 SFRS
						10	0.02	< 0.01	< 0.01	
						14	0.01	< 0.01	< 0.01	
Montezuma, GA, 1994 (Yellow Crookneck)	SC	0.43	0.18	269	4	7	0.05	< 0.01	< 0.01	R-1070 BF-94R- 17WKT.03
		0.47	0.18	257		10	0.03	< 0.01	< 0.01	
		0.43	0.18	242		14	0.02	< 0.01	< 0.01	
		0.45	0.18	249						
Jamesville, NC, 1994 (Dixie)	SC	0.43	0.19	223	4	7	0.05	< 0.01	< 0.01	R-1070 BF-94R-17 JWS.02
		0.41	0.16	252		10	0.03	< 0.01	< 0.01	
		0.43	0.16	267		14	0.02	< 0.01	< 0.01	
		0.41	0.15	273						
Brookshire, TX, 1994 (Early Crookneck)	SC	0.41	0.22	186	4	7	0.03	< 0.01	< 0.01	R-1070 BF-94R-17 GLS.03
		0.43	0.23	187		10	0.02	< 0.01	< 0.01	
		0.44	0.23	194		14	0.01	< 0.01	< 0.01	
		0.43	0.22	190						
Conklin, MI, 1994 (Lemondrop L)	SC	0.41	0.19	214	4	7	0.03	< 0.01	< 0.01	R-1070 BF-94R-17 JRS.02
		0.43	0.20	214		10	0.02	< 0.01	< 0.01	
		0.43	0.18	234		14	0.01	< 0.01	< 0.01	
		0.43	0.20	214						
New Holland, OH, 1994 (Zucchini)	SC	0.43	0.27	160	4	7	0.04	< 0.01	< 0.01	R-1070 BF-94R-17 JRS.04
		0.41	0.26	161		10	0.02	< 0.01	< 0.01	
		0.41	0.25	166		14	0.01	< 0.01	< 0.01	
		0.43	0.29	146						
Baptistown, NJ, 1994 (Sundance)	SC	0.43	0.18	237	4 ^a	7	0.03	< 0.01	< 0.01	R-1070 BF-94R-17 DRS.01
		0.43	0.18	234		10	0.03	< 0.01	< 0.01	
		0.43	0.18	239		14	0.02	< 0.01	< 0.01	

SUMMER SQUASH	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
		0.43	0.18	236						
Waterloo, NY, 1994 (Back Beauty)	SC	0.41	0.22	185	4	7	0.04	< 0.01	< 0.01	R-1070 BF-94R-17 DRS.03
		0.43	0.23	187		10	0.04	< 0.01	< 0.01	
		0.43	0.23	189		14	0.02	< 0.01	< 0.01	
		0.41	0.23	184						
East Bernard, TX, 1994 (Straightneck)	SC	0.43	0.23	187	4	7	0.04	< 0.01	< 0.01	R-1070 BF-94R-17 GLS.04
						10	0.02	< 0.01	< 0.01	
						14	0.02	< 0.01	< 0.01	
Lake Jem, FL, 1994 (Dixie Hybrid/Yellow Crookneck)	SC	0.43	0.23	187	4	7	0.02	< 0.01	< 0.01	R-1070 BF-94R-17 WKT.02
						10	0.02	< 0.01	< 0.01	
						14	0.01	< 0.01	< 0.01	
Zellwood, FL, 1994 (Dixie Hybrid/Yellow Crookneck)	SC	0.43	0.23	187	4	7	0.11	< 0.01	< 0.01	R-1070 BF-94R-17 WKT.04
						10	0.07	< 0.01	< 0.01	
						14	0.02	< 0.01	< 0.01	

^a The interval between the 3rd and 4th applications was 4 days.

Fruiting vegetables, other than Cucurbits

The Meeting received information on supervised residue trials conducted in the USA on tomato and peppers as summarized in Tables 18 and 19.

A total of 18 supervised field trials on tomato were conducted in the USA in 2003 and 2005 (Stewart, 2004; and Samoil, 2007). Each treated plot received two foliar applications of the 70WP or 40SC formulation at a rate of 0.41–0.47 kg ai/ha.

In the four trials in 2003 with the WP formulation, the treatment interval was 28 days. The time from sampling to analysis was up to 72 days. Analyses were performed using AgroEvo Method No. BF/05/94 with modification (GC-NPD method) with the LOQ of 0.01 mg/kg and the average percent recovery of 96% for buprofezin, 99% for BF9 and 86% for BF12. The residues in control plots were all below the LOQ.

In the 14 trials in 2005 with the WP or SC formulation, the treatment interval was 24–30 days. The time from sampling to analysis was up to 66 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method) with the LOQ of 0.05 mg/kg and the average percent recovery of 103%. The residues in control plots were all below the LOQ.

A total of 11 supervised field trials on peppers, eight on bell pepper and three on non-bell pepper, were conducted in the USA in 2004 (Samoil, 2007). Each treated plot received two foliar applications of the 40SC formulation at a rate of 0.42–0.45 kg ai/ha. The treatment interval was 4–6 days. The time from sampling to analysis ranged from 176 to 251 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The percent recovery ranged from 70–92%. The residues in control plots were all below the LOQ.

Table 18 Buprofezin residues in tomato from supervised trials in the USA

TOMATO	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		0.43			2	1				
Bradenton, FL, 2003 (FL-47)	WP	0.43	0.05	897	2 ^a	1	0.09, 0.12	< 0.01	< 0.01	R-1162 FL-15
		0.42	0.05	869		3	0.04, 0.04	< 0.01	< 0.01	

TOMATO Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no			
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12				
Madera, CA, 2003 (Ace 55)	WP	0.43	0.15	280	2 ^a	1	0.02, 0.04	< 0.01	< 0.01	R-1162 CA-15A			
		0.42	0.15	280		3	0.04, 0.03	< 0.01	< 0.01				
						7	0.04, 0.02	< 0.01	< 0.01				
						10	0.02, 0.03	< 0.01	< 0.01				
LeGrand, CA, 2003 (U941)	WP	0.43	0.06	748	2 ^a	1	0.09, 0.06	< 0.01	< 0.01	R-1162 CA-15B			
		0.42	0.06	739		3	0.04, 0.05	< 0.01	< 0.01				
Glenn, CA, 2003 (H8892)	WP	0.43	0.22	196	2 ^a	1	0.22, 0.14	< 0.01	< 0.01	R-1162 CA-15C			
		0.43	0.18	243		3	0.17, 0.14	< 0.01	< 0.01				
Holtville, CA, 2005 (#9997)	SC	0.42 0.43	0.17 0.17	252 252	2	1	0.12, 0.097			R-1211 CA55			
Holtville, CA, 2005 (#9997)	SC	0.43 0.43	0.17 0.16	252 262	2	1	0.13, 0.12			R-1211 CA56			
Davis, CA, 2005 (Shady Lady)	SC	0.42 0.43	0.15 0.15	280 280	2	1	0.08, 0.06			R-1211 CA57			
	WP	0.43 0.41	0.15 0.15	290 271	2	1	0.13, 0.07						
Davis, CA, 2005 (AB-2)	SC	0.43 0.42	0.15 0.15	280 280	2	1	0.07, 0.08			R-1211 CA58			
Parlier, CA, 2005 (H-1570)	SC	0.43	0.12	374	2	1	0.14, 0.10			R-1211 CA59			
		0.43	0.11	374									
Parlier, CA, 2005 (Cherry Grande)	SC	0.43	0.18	234	2	1	0.54, 0.40			R-1211 CA60			
		0.43	0.18	234									
Irvine, CA, 2005 (Bobcat)	WP	0.43 0.43	0.11 0.11	383 383	2	1	0.06, 0.08			R-1211 CA61			
	SC	0.43 0.44	0.11 0.09	383 486							2	1	0.07, 0.05
Citra, FL, 2005 (Super Sweet 100)	SC	0.42 0.45	0.15 0.15	280 299	2	1	< 0.05, 0.18			R-1211 FL22			
Citra, FL, 2005 (Solar Sett)	SC	0.45 0.45	0.15 0.15	290 299	2	1	0.10, 0.06			R-1211 FL23			
	WP	0.45 0.44	0.15 0.15	299 290							2	1	0.18, 0.16
Salisbury, MD, 2005 (Sunbeam)	SC	0.43 0.43	0.13 0.14	318 318	2	1	< 0.05, 0.05			R-1211 MD10			
	WP	0.42 0.42	0.13 0.13	318 318							2	1	0.09, 0.07
Bridgeton, NJ, 2005 (Florida 47)	SC	0.47 0.46	0.14 0.13	346 346	2	1	0.08, 0.10			R-1211 NJ13			
Las Cruces, NM, 2005 (Cal-Ace)	SC	0.44 0.43	0.08 0.08	524 514	2	1	< 0.05, 0.06			R-1211 NM12			
Las Cruces, NM, 2005 (Celebrity VFN)	SC	0.42 0.43	0.18 0.18	234 234	2	1	0.09, 0.08			R-1211 NM13			
Arlington, WI, 2005 (Celebrity)	SC	0.43 0.41	0.22 0.19	196 224	2	1	0.11, 0.13			R-1211 WI10			

^a The interval between applications was 28 days.

Table 19 Buprofezin residues in peppers from supervised trials in the USA

PEPPERS Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg	Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	
US GAP (max)		0.43			2	1		
Riverside, CA, 2004 (Bell pepper:	SC	0.42 0.44	0.12 0.11	365 383	2	1	0.76, <u>0.96</u>	R-1212 08848.04-CA50

PEPPERS Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.			
Taurus)								
Davis, CA, 2004 (Bell pepper: Taurus)	SC	0.43 0.43	0.13 0.13	327 327	2	1	0.10, <u>0.12</u>	R-1212 08848.04-CA51
Citra, FL, 2004 (Bell pepper: Taurus)	SC	0.43 0.43	0.13 0.13	337 327	2	1	0.47, <u>0.52</u>	R-1212 08848.04-FL22
Citra, FL, 2004 (Bell pepper: Lexington 338G)	SC	0.44 0.44	0.13 0.13	337 346	2	1	0.31, <u>0.34</u>	R-1212 08848.04-FL23
Clinton, NC, 2004 (Bell pepper: Crusader)	SC	0.43 0.43	0.14 0.14	299 299	2	1	0.28, <u>0.33</u>	R-1212 08848.04-NC11
Bridgeton, NJ, 2004 (Bell pepper: King Arthur)	SC	0.42 0.45	0.14 0.14	299 318	2	1	0.31, <u>0.31</u>	R-1212 08848.04-NJ12
Weslaco, TX, 2004 (Bell pepper: Capistrano)	SC	0.42 0.42	0.14 0.14	290 290	2	1	<u>0.19</u> , 0.16	R-1212 08848.04-TX21
Arlington, WI, 2004 (Bell pepper: Midway)	SC	0.44 0.44	0.13 0.13	346 346	2	1	0.15, <u>0.16</u>	R-1212 08848.04-WI06
Citra, FL, 2004 (Non-bell pepper: Grande 338G)	SC	0.44 0.44	0.13 0.13	337 337	2	1	0.42, <u>0.54</u>	R-1212 08848.04-FL24
Mesilla, NM, 2004 (Non-bell pepper: Big Jim)	SC	0.42 0.43	0.13 0.12	337 374	2	1	<u>0.17</u> , 0.10	R-1212 08848.04-NM03
Weslaco, TX, 2004 (Non-bell pepper: Sonora Anaheim)	SC	0.43 0.43	0.14 0.12	299 346	2	1	<u>1.1</u> , 1.0	R-1212 08848.04-TX*22

Legume vegetables

The Meeting received information on supervised residue trials conducted in the USA on snap bean (common beans (pods and/or immature seeds) as summarized in Table 20.

A total of seven supervised field trials on snap beans were conducted in the USA in 2000 (Samoil, 2007). Each treated plot received one foliar application of the 70WP formulation at a rate of 0.42–0.44 kg ai/ha. The treatment interval was 11–15 days. The time from sampling to analysis was up to 196 days. Analyses were performed using AgroEvo Method No. BF/10/97 with modification (GC-NPD method). The LOQ of the method was 0.02 mg/kg. The average percent recovery was 91–115%. The residues in control plots were all below the LOQ.

Green snap beans, which are referred to as “common bean (pod and/or immature seeds)” in the Codex Classification of Foods and Animal Feeds, were analysed.

Table 20 Buprofezin residues in common beans (pods and/or immature seeds) from supervised trials in the USA

COMMON BEANS Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg Buprofezin	Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.			
US GAP (max)		0.43			2	14		
Gainesville, FL, 2000 (Mirada)	WP	0.43 0.44	0.15 0.15	281 290	2	22	< 0.02, < 0.02	R-1171 07760.00-FL12
Tifton, GA, 2000	WP	0.43	0.15	281	2	16	<u>< 0.02</u> , < 0.02	R-1171

COMMON BEANS	Form	Application				PHI, days	Residues, mg/kg		Reference Trial no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin		
(Strike)		0.43	0.09	477				07760.00-GA*06	
Kimberly, ID, 2000 (Idelite Garden bean)	WP	0.43 0.42	0.15 0.15	290 281	2	34	< 0.02, < 0.02		R-1171 07760.00-ID13
Lafayette, IN, 2000 (Earliserve)	WP	0.43 0.43	0.19 0.19	224 224	2	9	≤ 0.02, < 0.02		R-1171 07760.00-IN01
Freeville, NY, 2000 (Labrador)	WP	0.44 0.43	0.16 0.16	281 271	2	24	< 0.02, < 0.02		R-1171 07760.00-NY05
Freemont, OH, 2000 (Strike)	WP	0.44 0.44	0.10 0.10	430 440	2	23	< 0.02, < 0.02		R-1171 07760.00-OH*06
Arlington, WI, 2000 (Hystyle)	WP	0.42 0.43	0.16 0.15	271 281	2	15	≤ 0.02, < 0.02		R-1171 07760.00-WI01

Tree nuts

The Meeting received information on supervised residue trials conducted in the USA on almond as summarized in Table 21. Almond nutmeat was analysed.

A total of six supervised field trials on almond were conducted in the USA in 1996 (Cole, 1997). Each treated plot received one foliar application of the 70WP formulation at a rate of 2.24 kg ai/ha. The time from sampling to analysis was up to 320 days. Analyses were performed using AgroEvo Method No. BF/06/94 with modification (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The average percent recovery was 96% for buprofezin. The residues in control plots were all below the LOQ.

Table 21 Buprofezin residues in almond (nutmeat) from supervised trials in the USA

ALMOND	Form	Application				PHI, days	Residues, mg/kg			Reference Trial site no
Location, year (variety)		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		2.26			1	60				
Fresno, CA, 1996 (Mission)	WP	2.24	0.20	1122	1	60	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-01
Reedley, CA, 1996 (unknown)	WP	2.24	-	-	1	60	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-02
Hickman, CA, 1996 (unknown)	WP	2.24	0.23	972	1	60	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-03
Yolo, CA, 1996 (unknown)	WP	2.24	0.26	860	1	60	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-04
Yuba City, CA, 1996 (unknown)	WP	2.24	0.24	935	1	59	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-05
Ord Bend, CA, 1996 (unknown)	WP	2.24	0.24	935	1	60	≤ 0.05, < 0.05	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-06

Seed for beverages and sweets

The Meeting received information on supervised residue trials conducted in the USA on coffee as summarized in Table 22.

A total of three independent supervised field trials on coffee were conducted in the USA in 2004 (Samoil, 2008). Each treated plot received four foliar application of the 70WP formulation at a rate of 1.12–1.23 kg ai/ha. The treatment interval was 14 days. The time from sampling to analysis was up to 656 days. Analyses were performed using a method similar to AgroEvo Method No.

BF/06/94 (GC-NPD method). The LOQ of the method was 0.01 mg/kg for green coffee beans. The percent recovery ranged from 70 to 90%. The residues in control plots were all below the LOQ.

Table 22 Buprofezin residues in coffee from supervised trials in the USA

COFFEE Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin			
US GAP (max)		1.12			4	0				
Eleele, Kauai, HI, 2004 (Caturra)	WP	1.17	0.12	973	4	0	0.24		IR-4 08828 HI-04	
		1.17	0.12	963						
		1.13	0.12	945						
		1.13	0.12	935						
		1.14	0.40	281	4	0	0.14, 0.08	HI-05		
Kealakekua, Hawaii, HI, 2004 (Guatemalan Kona typical) ^a	WP	1.12	0.24	468	5 ^b	0	0.06, 0.10		IR-4 08828 HI-06	
		1.14	0.24	477						
		1.18	0.24	486						
		1.14	0.24	477						
		1.13	0.24	468						
Kealakekua, Hawaii, HI, 2004 (Guatemalan Kona typical) ^a	WP	1.23	0.10	1235	4	0	0.12, <u>0.12</u>		IR-4 08828 HI-07	
		1.12	0.10	1122						
		1.13	0.10	1132						
		1.14	0.10	1150						
Lahaina, Maui, HI, 2004 (Red Catuai)	WP	1.13	0.080	1422	4	0	<u>0.16</u> , 0.15		IR-4 08828 HI-08	
		1.12	0.079	1412						
		1.13	0.080	1412						
		1.13	0.080	1422						

^a These trials were conducted in two different farms.

^b Fifth application was made 8 days after the fourth application.

Animal feed

The Meeting received information on supervised residue trials conducted in the USA on almond as summarized in Table 21. Almond hulls were analysed.

The time from sampling to analysis in the 1997 trials (see Table 21) was up to 331 days. AgroEvo Method No. BF/06/94 with modification (GC-NPD method). The LOQ of the method was 0.05 mg/kg. The average percent recovery was 96%.

In addition to the 1997 trials, a supervised trial was conducted in 2003 in the USA (Stewart, 2004). The plot received one foliar application of the 70WP formulation at a rate of 2.26 kg ai/ha. The time from sampling to analysis was up to 68 days. Analyses were performed using method. The LOQ of the method was 0.05 mg/kg. The percent recovery was 90–96% for buprofezin. The residues in control plots were all below the LOQ.

Table 23 Buprofezin residues in almond hull from supervised trials in the USA (Cole, 1997; and Stewart, 2004)

ALMOND HULL Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
US GAP (max)		2.26			1	60				
Fresno, CA, 1996 (Mission)	WP	2.24	0.20	1122	1	60	0.47, 0.55	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-01
Reedley, CA, 1996 (unknown)	WP	2.24	-	-	1	60	0.15, 0.15	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-02
Hickman, CA, 1996 (unknown)	WP	2.24	0.23	972	1	60	0.06, 0.07	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-03

ALMOND HULL Location, year (variety)	Form	Application				PHI, days	Residues, mg/kg			Reference Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.		Buprofezin	BF9	BF12	
Yolo, CA, 1996 (unknown)	WP	2.24	0.26	860	1	60	0.20, 0.23	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-04
Yuba City, CA, 1996 (unknown)	WP	2.24	0.24	935	1	59	0.20, 0.25	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-05
Ord Bend, CA, 1996 (unknown)	WP	2.24	0.24	935	1	60	0.09, 0.08	< 0.05, < 0.05	< 0.05, < 0.05	R-1088 R10-06
Madera, CA, 2003 (Mission)	WP	2.26	0.24	939	1	60	1.42, 1.64, 1.76, 1.16	< 0.05×4	< 0.05×4	R-1161

FATE OF RESIDUES IN STORAGE AND PROCESSING

In processing

The Meeting received information on the effect of processing on residues in apple, plum, cherry and coffee.

A study was conducted to determine the magnitude of residues in apples, apple juice, and wet pomace following one application of Buprofezin (70WP) to commercial crops at an exaggerated rate (total rate 3.36 kg ai/ha) (Stewart, 2002). The laboratory processing closely simulated that used in the commercial processing of apples and followed the guidelines of US EPA. Samples were stored in a cold room at 5–10 °C for up to 3 days before processing. The fresh apples were hand fed into the crusher/stemmer. The apple pulp was collected and stems were discarded. The apple pulp was pressed using a hydraulic press to separate the juice and pulp. The fresh juice collected from the pressing operation was filtered to remove coarse solids.

Raw and processed samples were stored frozen for up to 9.5 and 6 months, respectively, before analysis by LC-MS/MS (Method Buprofezin/Crops/DB/02/1) with the LOQ at 0.1 mg/kg. The average concurrent recovery was 88% for buprofezin in apple. Residues found in samples are given in Table 24.

Table 24 Buprofezin residues in apple and its processed commodities from supervised trials in the USA

Location, year (variety)	Form	Application				PHI, days	RAC Processed commodity	Buprofezin, mg/kg	Reference
		kg ai/ha	kg ai/hL	Water, L/ha	No.				
Alton, NY, 2001 (Golden Delicious)	WP	3.38	0.45	752	1	14	Fruit Juice Wet pomace	2.07 1.16, 1.21 4.02, 4.45	R-1113

A study determined the magnitude of residues in plum fruit and prunes (dried plum) following one application of Buprofezin (70WP) to commercial crops (total rate 1.78 and 1.78 kg ai/ha) (Samoil, 2005). Plums intended for drying were placed on drying trays after the pits had been removed and stored at 60 °C for two days, after which the dried plum samples were put into frozen storage. Fresh plum samples were stored in a freezer at –20 °C after collection. All samples were kept frozen for up to 11 months before analysis by GC-NPD (Method Buprofezin/Crops/BF/10/97) with a calculated LOQ of 0.04 mg/kg. The mean concurrent recovery was 84% for buprofezin in plum and 85% for prune. Residues found in samples are given in Table 25.

Table 25 Buprofezin residues in plum and prunes from supervised trials in the USA

Location, year (variety)	Form	Application				PHI, days	RAC Processed commodity	Buprofezin, mg/kg	Reference
		kg ai/ha	kg ai/hL	Water, L/ha	No.				
Parlier, CA, 2002 (Casselman)	WP	1.79	0.11	1664	2	14	Fruit	0.07	R-1170
		1.78	0.11	1683			Prune	0.21	

Another study was conducted to determine the magnitude of residues in cherries, cherry juice, and cherry puree following one application of Buprofezin (25WP and 40SC) to commercial crops at a rate of 500 g ai/ha on the treated plots (Dimenichini, 2003). Samples were collected 14 days after the application, frozen within the day of sampling, and stored frozen (−18 °C) up to the day of processing. The processing followed normal procedures for juice and jam:

Juice preparation: after removal of the stones, fruits were cut into fairly small pieces using a food processor machine; they were then twice centrifuged to extract the juice and the cloudy liquid was filtered through a sieve and then centrifuged. The clear juice obtained was put into jars previously sterilized and then pasteurized.

Jam preparation: after removal of the stones, fruits were cut into fairly small pieces using a food processor machine. Cut fruits were heated at 70 °C and passed through the fruit masher. For each kilogram of cherries, 500 g of sugar was added: this mixture was boiled for 1 hour. The obtained jam was then put into jars.

Juice and jam specimens were then deep-frozen and stored in the freezer (between −18 °C and −25.7 °C) until arrival at the analysis laboratory. Buprofezin in these samples were analysed by LC-MS/MS (Method Buprofezin/Crops/DB/02/1) with the LOQ of 0.01 mg/kg for buprofezin, BF9 and BF12. The mean concurrent recovery was 92, 101 and 80% for buprofezin in cherry fruit, juice and jam respectively. Residues found in samples are given in Table 26.

Table 26 Buprofezin residues in cherry and its processed commodities from supervised trials in Italy

Location, year (variety)	Form	Application				PHI, days	RAC Processed commodity	Residues, mg/kg			Ref. Trial no
		kg ai/ha	kg ai/hL	Water, L/ha	No.			Buprofezin	BF9	BF12	
Modena, 2001 (Celeste)	WP	0.52	0.033	1564	1	14	Fruit	0.054	< 0.01	< 0.01	R-1179 BU2/I/09CL
							Juice	< 0.01	< 0.01	< 0.01	
							Jam	< 0.01	< 0.01	< 0.01	
Modena, 2001 (Celeste)	SC	0.52	0.033	1573	1	14	Fruit	0.064	< 0.01	< 0.01	
							Juice	< 0.01	< 0.01	< 0.01	
							Jam	< 0.01	< 0.01	< 0.01	

A grape processing study was conducted in the USA in 1996 to investigate residues in young wine, juice and raisins following two applications of 70WP formulation with an interval of 15 days at a rate of 2.8 kg ai/kg which is equivalent to five times the maximum GAP rate of 0.59 kg ai/ha (Nezband and Neal, 1997). Processing was carried out in a manner similar to that in the studies submitted to the 2008 JMPR (2008 JMPR Evaluation, pages 312–315). Samples of raw materials and processed commodities were stored frozen up to 12 and 10 months respectively before analysis by a GC-NPD method with an LOQ of 0.01 mg/kg. The mean concurrent recovery was 85% for buprofezin in grapes. Residues found in samples are given in Table 27. For recalculating processing factors from the studies provided to the 2008 JMPR, relevant data with quantifiable residues in processed commodities were copied in Table 27.

Table 27 Buprofezin residues in grapes and its processed commodities from supervised trials in the USA, France and Italy.

Location, year (variety)	Application			PHI, days	RAC Processed commodity	Residues, mg/kg			PF	Ref. Trial no
	kg ai/ha	kg ai/hL	No.			Buprofezin	BF9	BF12		
Fresno, CA, 1996 (Tompson Seedless)	2.9		2	14	Fruit	0.14	< 0.01	0.01	-	R-1085 R10-01
	2.8				Juice	0.02	< 0.01	0.04	0.14	
					Raisins	0.34	0.03	0.22	2.4	
Maine et Loire, N- France, 2002 (Gamay)	0.50	0.033	1	14	Fruit	0.28	< 0.01	< 0.01	-	2008 JMPR R-1143 AF/6773/NN/1
					Red wine	0.19	< 0.01	< 0.01	0.68	
					Juice	0.18	< 0.01	0.03	0.64	
Maine et Loire, N- France, 2002 (Chemin)	0.49	0.033	1	14	Fruit	0.15	< 0.01	< 0.01	-	2008 JMPR R-1143 AF/6773/NN/2
					White wine	0.18	< 0.01	< 0.01	1.2	
					Juice	0.08	< 0.01	0.02	0.53	
Saône et Loire, N- France, 2002 (Aligote)	0.50	0.033	1	14	Fruit	0.08	< 0.01	< 0.01	-	2008 JMPR R-1143 AF/6773/NN/3
					White wine	0.11	< 0.01	< 0.01	1.4	
					Juice	0.05	< 0.01	< 0.01	0.63	
Lodi, Italy, 2001 (Chardonnay)	0.38	0.038	1	60	Fruit	0.018	< 0.01	< 0.01	-	2008 JMPR R-1182 BU1/I/14VI
					White wine	0.010	< 0.01	0.19	0.56	
Lodi, Italy, 2001 (Chardonnay)	0.38	0.038	1	44	Fruit	0.037	< 0.01	< 0.01	-	2008 JMPR R-1182 BU1/I/14VI
					White wine	0.019	< 0.01	0.013	0.51	
Garonne, S- France, 2001 (Gamay)	0.37	0.038	1	76	Fruit	0.021	< 0.01	< 0.01	-	2008 JMPR R-1182 BU1/I/19VI
					Red wine	0.011	< 0.01	< 0.01	0.52	

A study was conducted to determine the magnitude of residues in olive fruit and oil following two applications of Buprofezin (70WP) to commercial crops (total rate 12.1 and 12.1 kg ai/ha) (Samoil, 2005). Samples were processed immediately simulating industrial practice as closely as possible. Clean, mature olives are ground in a mill with no screen prior to crushing in a hydraulic press. The press separates the vegetable fluid and oil from the husk and seed. The vegetable fluid and oil are separated using a centrifuge and/or separatory funnel. Samples of olive and olive oil were stored frozen for up to 241 days before analysis using a GC-NPD method very similar to analytical method BF/10/97. The LOQ was calculated to be 0.028 mg/kg for fruit and 0.033 for oil. The concurrent recovery ranged from 81 to 98% in fruit without pits and was 103% for oil. Residues found in samples are given in Table 28.

Table 28 Buprofezin residues in olive and its processed commodities from supervised trials in the USA

OLIVE Location, year (variety)	Form	Application				PHI, days	RAC Processed commodity	Residues, mg/kg	Reference
		kg ai/ha	kg ai/hL	Water, L/ha	No.			Buprofezin	
Orange Cove, CA, 2004 (Manzillo)	WP	12.14	0.87	1393	2	21	Olive fruit	10.16	R-1186
		12.09	0.86	1402			Olive oil	31.02	

A study to determine the magnitude of residues in green coffee bean, roasted coffee, and freeze dried coffee, following four applications of Buprofezin (70WP) to commercial crops (total rate

4.59 kg ai/ha) (Samoil, 2008). Samples were stored in a freezer at -20 °C after collection before processing simulating the commercial industrial practice as closely as possible.

Roasting: A dual compartment roaster was used for roasting the beans in 500 g batches per compartment. After charging of the compartments, the beans were roasted for 1–2 minutes after the first “crack”, a sound similar to popcorn as it first starts to pop. They were then spread onto the attached cooling tray of the roaster, where they remained while the empty chamber was being recharged with beans. Beans were then transferred to a screen bottom-accumulating tray where they were allowed to continue cooling until the last batch of beans had been roasted.

Grinding: The cooled, roasted beans were then ground through a screen (0.0635 inch (1.613 mm) diameter holes) in a mill outfitted with the head for the swinging knives/hammers in the “knives forward” position.

Brewing, extraction & filtration: Brewing, extraction and filtration were done concurrently. Ground coffee was added to a 40 gallon (150 L) steam jacketed kettle filled approximately half full with ion-exchanged water. The mixture of ground coffee and water was stirred as it was heated to 91–96 °C. The heated mixture was pumped from the kettle outlet to a plate and frame filter press. The discharge stream from the filter press was diverted back to the kettle for a minimum of 20 minutes to enhance extraction via circulation of the liquid through the ground coffee in the filter press. When kettle was emptied, the remaining liquid in the filter was expelled with compressed air and directed to a separate stainless steel stockpot whereupon it was combined with the bulk of the filtered coffee in a larger stockpot.

Concentration of extract and freeze-drying: The volume of the extract was reduced by a film evaporator to a level to fit in the freeze dryer. Concentration took place under vacuum. The concentrated extract was then transferred to the freeze dryer trays. After filling, the trays were pushed all the way into the freeze dryer. With cleaned thermocouples inserted into the contents of trays, the door to the dryer was latched and the shelf freezer was turned on. When the thermocouples indicated the temperature of the contents was below -2 °C, the vacuum pump and the condenser were turned on. When the vacuum stabilized and the temperature of the contents of the trays appeared to be lower than -17 °C, the shelf freezer was turned off. The shelf heater was then turned on and set at 30 °C. Four days later the temperature readings from the thermocouples read the same as the temperature of the shelf heater indicating that the samples were dry and ready to be removed from the freeze dryer.

Raw and processed samples were stored frozen for up to 680 days, before analysis by a GC-NPD method (Method Buprofezin/Crops/BF/10/97). A study was set up which confirm stability of buprofezin in treated coffee samples stored frozen for up to 680 days. Procedural recoveries run concurrently with samples at levels of 0.05, 0.1, 0.5 and 5.0 mg/kg gave mean recoveries of 91%, 83%, 88%, and 90%, respectively for coffee green bean. For roasted bean, with samples at levels of 0.05, 0.1, 0.5 and 5.0 mg/kg, the mean recoveries were 90%, 96%, and 90%, respectively. Residues found in coffee samples are given in Table 29. No concentration was seen in dried bean or freeze-dried coffee.

Table 29 Buprofezin residues in coffee and its processed commodities from supervised trials in the USA

COFFEE Location, year (variety)	Form	Application				PHI, days	RAC Processed commodity	Buprofezin mg/kg	Reference
		kg ai/ha	kg ai/hL	Water, L/ha	No.				
Eleele, Kauai, HI, 2004 (Caturra)	WP	1.17	0.12	973	4	0	Bean	0.239	IR-4 08828
		1.17	0.12	963			Roasted coffee	0.077	
		1.13	0.12	945			Freeze-dried coffee	< 0.05	
		1.13	0.12	935					

Processing factors were calculated for apple, plum, cherry, grape, olive and coffee. The Meeting re-calculated processing factors for grape from the studies reviewed by the 2008 JMPP (see

pages 312–315) on the basis of buprofezin residues in the raw materials used in processing and residue concentration above the LOQ. Calculated processing factors for apple, plum, cherry, grape, olive and coffee are summarized in Table 30.

Table 30 Summary of calculated processing factors

Commodity	Calculated processing factor	Processing factor (median or best estimate)
Apple juice	0.56, 0.58	0.57
Apple wet pomace	1.9, 2.1	2.0
Prune	3	3
Cherry juice	< 0.19, < 0.16	< 0.17
Cherry jam	< 0.19, < 0.16	< 0.17
Grape juice	0.14, 0.53, 0.63, 0.64	0.58
White wine	0.51, 0.56, 1.2, 1.4	0.88
Red wine	0.52, 0.68	0.60
Dried grapes	1.5, 2.0, 2.4, 3.4	2.2
Olive oil	3.1	3.1
Roasted coffee	0.32	0.32
Freeze-dried coffee	< 0.2	< 0.2

APPRAISAL

Buprofezin, (an insecticide), was evaluated by JMPR in 1991 for the first time and then in 1995 and 1999. It was reviewed under the Periodic Re-evaluation Programme in 2008 for toxicity and residues. The 2008 JMPR allocated an ADI of 0–0.009 mg/kg bw and ARfD of 0.5 mg/kg bw. It concluded that the residue definition for compliance with the MRL and for estimation of dietary intake, both for animal and plant commodities should be buprofezin, and recommended eight maximum residue levels while withdrawing one previous recommendation.

The current Meeting received information on use pattern and trials concerning pome fruits, stone fruits, berry fruits, tropical fruits, cucurbits, fruiting vegetables other than cucurbits, beans, olives, tree nuts and coffee. The Meeting also received information on some storage stability studies additional to those submitted to the 2008 JMPR.

Stability of pesticide residues in stored analytical samples

The Meeting received storage stability studies conducted in 2006 on banana, potato, wheat, almond, grape, orange, and some of their processed products.

Buprofezin, which is the only component of the definition of residue, was generally stable when stored at -20 ± 5 °C for the longest interval tested for each matrix. Among those crops for which supervised residue trials were conducted and submitted to the current Meeting, buprofezin was stable up to 881 days in almond nutmeat, 78 days in almond hulls, 368 days in grapes and 374 days in dried grapes.

Results of supervised residue trials on crops

The Meeting received supervised residue trial data for buprofezin on apple, pear, peach, plum, cherry, grapes, strawberry, olive, lychee, avocado, guava, papaya, cucumber, cantaloupe, summer squash, tomato, peppers, common bean (pods and/or immature seeds), almond nutmeat and hulls, and coffee. The trials in the USA were conducted outdoors.

The NAFTA calculator was used as a tool in the estimation of the maximum residue level from the selected residue data set 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 statistical 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 statistical estimate include when the number of data points in a data set is < 15 or when there are a large number of values <LOQ.

Pome fruits

Supervised trials were conducted on apple in the USA with one application of 1.67–1.71 kg ai/ha and in one trial with an exaggerated rate of 3.38 kg ai/ha. The residues of buprofezin from supervised trials in compliance with the maximum US GAP for apple (1.69 kg ai/ha × 1, PHI 14 days) were in rank order: 0.02, 0.05, 0.11, 0.15, 0.18, 0.24, 0.32, 0.55, 0.58, 0.75, 0.85, 0.99 mg/kg (n = 12).

The Meeting estimated a maximum residue level of 3 mg/kg, STMR of 0.28 mg/kg and HR of 0.99 mg/kg for apple.

The NAFTA calculator indicates an MRL of 3.0 mg/kg (UCLMedian95th) which agrees with the maximum residue level of 3 mg estimated by the current Meeting.

Supervised trials were conducted on pears including oriental pears in the USA with two application at 1.702.02 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for pear (2.26 kg ai/ha × 2, not more than 3.37 kg ai/ha per growing season, PHI 14 days) were: 0.40, 0.60, 0.86, 1.09, 1.11, 1.31 and 3.64 mg/kg (n = 7).

The Meeting estimated a maximum residue level of 6 mg/kg, STMR of 1.09 mg/kg and HR of 3.64 mg/kg for pear.

The NAFTA calculator indicates 6.0 mg/kg (95/99 Rule) which agrees with the maximum residue level of 6 mg by estimated the current Meeting.

Stone fruits

Supervised trials were conducted on peach, plums and cherries in the USA with two applications at 1.701.87 kg ai/ha except two trials on peach.

In the two trials on peach, one in California and the other in New Jersey, application was made three times and four times. However, since the last application contributes most to the residues of buprofezin in harvested fruits, the Meeting agreed to use the results of these trials despite more applications were made than specified in GAP. In the trial with three applications, the rate of the last application was not sufficiently high and lower than that of all other trials, but duplicate samples showed the high residues of 5.58 and 8.13 mg/kg.

The residues of buprofezin in peach from trials in accordance with the maximum US GAP for stone fruits (2.26 kg ai/ha × 2, not more than 3.37 kg ai/ha per growing season, PHI 14 days) and the two other trials were: 0.12, 0.40, 0.45, 0.84, 0.89, 1.31, 1.40, 1.77, 2.20, 2.36, 3.11 and 8.13 mg/kg (n = 12).

The residues of buprofezin in plums from trials in accordance with the maximum US GAP for stone fruits were: 0.05, 0.08, 0.08, 0.23, 0.26 and 0.55 mg/kg (n = 6).

The residues of buprofezin in cherries, both sweet and tart, from trials in accordance with the maximum US GAP for stone fruits were: 0.31, 0.45, 0.46, 0.54, 0.57, 0.89, 1.00, 1.01, 1.20 and 1.32 mg/kg (n = 10).

Two trials were conducted on cherry in Italy but no GAP information was available for Southern Europe.

Since the residue populations of peach, plums and cherries were significantly different (Kruskal-Wallis test), the Meeting agreed to estimate maximum residue levels separately for these commodities.

The Meeting estimated a maximum residue level, STMR and HR of 9, 1.355 and 8.13 respectively for peach. The Meeting agreed to extrapolate this maximum residue level for peach to nectarine.

The NAFTA calculator indicates 9.0 mg/kg (UCLMedian95th) which agrees with the maximum residue level of 9 mg estimated by the current Meeting.

The Meeting estimated a maximum residue level, STMR and HR of 2, 0.155 and 0.55 mg/kg respectively for plums.

The NAFTA calculator indicates 1.3 mg/kg (95/99 Rule & UCLMedian95th). With the maximum application rate in the trials about 25% less than that specified in GAP, there is a need for a higher maximum residue level and rounding up the value obtained from the calculator results in 2 mg/kg which agrees with the recommendation of the current Meeting.

The Meeting estimated a maximum residue level, STMR and HR of 3, 0.73 and 1.32 mg/kg respectively for cherries.

The NAFTA calculator indicates 2.5 mg/kg (95/99 Rule). With the maximum application level in the trials about 25% less than that specified in GAP, there is a need for a higher maximum residue level. Rounding up the value obtained from the calculator results in 3 mg/kg which agrees with the maximum residue level estimated by the current Meeting.

Berries and other small fruits

Supervised trials were conducted on grapes in the USA with two applications at 0.52, 0.56 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for grapes (0.59 kg ai/ha × 2, PHI 7 days) were: 0.04, 0.05, 0.09, 0.13, 0.14, 0.14, 0.17, 0.18, 0.28, 0.38, 0.39, 0.55, 0.74 mg/kg (n = 13). The Meeting estimated a maximum residue level, STMR and HR at 1, 0.17 and 0.74 mg/kg respectively for grapes.

The NAFTA calculator indicates 1.1 mg/kg (UCLMedian95th) which is equivalent to 1 mg/kg estimated by the current Meeting.

Supervised trials on strawberry were conducted in the USA with two applications at a rate of 0.38, 0.40 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for low-growing berries (0.38 kg ai/ha × 2 10 days apart, PHI 3 days) were: 0.09, 0.15, 0.39, 0.44, 0.55, 0.85, 1.24 mg/kg (n = 7). The Meeting estimated a maximum residue level, STMR and HR at 3, 0.44 and 1.24 mg/kg respectively for strawberry.

The NAFTA calculator indicates 3.5 mg/kg (95/99 Rule, UCLMedian95th). However, the previously evaluated residue data on strawberries for a range of pesticides indicate that a value of 3 mg/kg is sufficiently high to cover residues of buprofezin arising from uses of buprofezin.

Assorted tropical and sub-tropical fruit-edible peel

Supervised trials were conducted on olives in the USA with two applications at 2.37, 2.44 kg ai/ha. One trial was conducted at an exaggerated rate in order to investigate effect of processing on residues. The residues of buprofezin from trials in accordance with the maximum US GAP for olive (2.26 kg ai/ha × 2, PHI 21 days) were: 0.56, 1.10, 1.15 and 1.66 mg/kg (n = 4).

The Meeting estimated a maximum residue level, STMR and HR at 5, 1.125 and 1.66 mg/kg respectively.

The NAFTA calculator indicates 3.0 mg/kg (95/99 Rule). The number of trials is smaller than 5, to accommodate the likely variation of residues a higher maximum residue level was estimated.

Assorted tropical and sub-tropical fruit-inedible peel

Supervised trials were conducted on lychee in the USA with two applications at 1.72, 1.78 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for lychee (1.69 kg ai/ha × 2, PHI 21 days) were: 0.26 mg/kg. The Meeting concluded that data were insufficient to recommend a maximum residue level.

Supervised trials were conducted on avocado in the USA with two applications at 1.70, 1.91 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for avocado (1.69 kg ai/ha × 2, PHI 21 days) were: 0.23 mg/kg. The Meeting concluded that the data were insufficient to recommend a maximum residue level for avocado.

Supervised trials were conducted on guava in the USA with two applications at 1.77 kg ai/ha. No trial matched the maximum US GAP for guava (1.69 kg ai/ha × 2, PHI 21 days). The Meeting concluded that data were insufficient to recommend a maximum residue level.

Supervised trials were conducted on papaya in the USA with five applications at 0.42, 0.47 kg ai/ha. As only one trial (residues: 0.62 mg/kg) matched the US GAP, the Meeting concluded that data were insufficient to recommend a maximum residue level.

Fruiting vegetables, Cucurbits

The Meeting received information on supervised trials conducted on cucumber, cantaloupe and summer squash in the USA with two applications at 0.39, 0.47 kg ai/ha, except that in one trial the rate of the last application was 0.71 kg ai/ha. The GAP in the USA for cucurbits requires the maximum application rate of 0.43 kg ai/ha, maximum of four applications with the minimum of interval, and PHI of 7 days except in California where PHI is 10 days for crops other than cucumber.

In most trials, the interval between applications was five days, shorter than the minimum interval of seven days specified in GAP. The 2008 JMPR reviewed the same US trial data on cucumber as those provided to the current Meeting and regarded them not in compliance with US GAP. Nonetheless, the current Meeting decided to use the results of those trials with 5 day interval between applications for estimating a maximum residue level as, for the fast growing fruits, 5 day interval was acceptable.

Supervised trials were conducted on cucumber, both cucumbers for consuming fresh and for pickling, in the USA with four applications at 0.43 kg ai/ha. The residues of buprofezin from trials on cucumbers for consuming fresh in accordance with the maximum US GAP for cucurbits were: 0.01, 0.03, 0.04, 0.08 and 0.20 mg/kg. The residues of buprofezin from trials on cucumbers for pickling in accordance with the maximum US GAP for cucurbits were: 0.02, 0.02, 0.03, 0.03, 0.03, 0.03, 0.05, 0.09, 0.09 and 0.30 mg/kg (n = 10). The residue populations from trials on cucumbers for consuming fresh and for pickling were not significantly different (Mann-Whitney U-test).

Supervised trials were conducted on cantaloupe in the USA with four applications at 0.41–0.46 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for cucurbits were: 0.15, 0.16, 0.18, 0.19, 0.19, 0.20, 0.21, 0.33, 0.37 and 0.41 mg/kg (n = 10).

Supervised trials were conducted on summer squash in the USA with four applications at 0.41, 0.47 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for cucurbits were: 0.02, 0.03, 0.03, 0.04, 0.04, 0.04, 0.05, 0.05, 0.05, 0.11 mg/kg (n = 10).

The Meeting estimated a maximum residue level, STMR and HR for cucurbits, on a basis of trials on cantaloupe which led to higher residues, to be 0.7, 0.195 and 0.41 mg/kg. The Meeting withdrew the previously recommended maximum residue level of 0.2 mg/kg for cucumber.

The NAFTA calculator indicates 0.60 mg/kg (95/99 Rule). However, in order to cover crops in the group of fruiting vegetables, Cucurbits, a higher maximum residue level was necessary.

Fruiting vegetables, other than Cucurbits

The Meeting received information on supervised trials conducted on tomato and peppers in the USA with two applications at 0.41-0.47 kg ai/ha. The GAP in the USA for fruiting vegetables other than cucurbits requires a maximum application rate of 0.43 kg ai/ha, maximum of two applications and PHI of 1 day.

Supervised trials were conducted on tomato in the USA with two applications at 0.41, 0.47 kg ai/ha with the application interval of 24–30 days (GAP: minimum of 5 days). No trial matched the maximum US GAP. The Meeting, therefore, did not revise the previous recommendation of 1 mg/kg for tomato.

Supervised trials were conducted on peppers in the USA with two applications at 0.42, 0.45 kg ai/ha. The residues of buprofezin in bell peppers from trials in accordance with the maximum US GAP for fruiting vegetables other than cucurbits were: 0.12, 0.16, 0.19, 0.31, 0.33, 0.34, 0.52 and 0.96 mg/kg. The residues of buprofezin in non-bell peppers from trials in accordance with the maximum US GAP for fruiting vegetables other than cucurbits were: 0.17, 0.54 and 1.1 mg/kg. The residue populations from trials on bell pepper and non-bell pepper were not significantly different (Mann-Whitney U-test), the Meeting decided to merge these results for the estimation of a maximum residue level. Combined residues were in rank order: 0.12, 0.16, 0.17, 0.19, 0.31, 0.33, 0.34, 0.52, 0.54, 0.96 and 1.1 mg/kg (n = 11).

The Meeting estimated a maximum residue level for peppers to be 2 mg/kg.

The Meeting estimated an STMR and HR of 0.33 and 1.1 mg/kg respectively for peppers.

The NAFTA calculator indicates 1.9 mg/kg (95/99 Rule). The common practice of JMPR is to use one significant figure for maximum residue levels below 10 mg/kg. Rounding up the value to one significant figure results in 2 mg/kg which coincides with the recommendation of the Meeting.

Legume vegetables

Supervised trials were conducted on common bean (pods and immature seeds) in the USA with two applications at 0.42–0.44 kg ai/ha. The residues of buprofezin from trials in accordance with the maximum US GAP for snap bean (0.43 kg ai/ha × 2, PHI 14 days) were: < 0.02 mg/kg (3). Meeting concluded that data was insufficient to recommend a maximum residue level.

Tree nuts

Supervised trials were conducted on almonds in the USA with one application at 2.24 kg ai/ha. The residues of buprofezin in nutmeat from trials in accordance with the maximum US GAP for almond (2.26 kg ai/ha × 1, PHI 60 days) were: <0.05 mg/kg (6).

The Meeting estimated a maximum residue level, STMR and HR of 0.05 (*), 0.05 and 0.05 mg/kg respectively for almonds.

As the residues from all the trials matching GAP were below the LOQs, the NAFTA calculator was not used.

Coffee

Supervised trials were conducted on coffee in Hawaii in the USA with four applications at 1.12, 1.23 kg ai/ha. The residues of buprofezin in green coffee beans from trials in accordance with the maximum US GAP for coffee (1.12 kg ai/ha × 4, PHI 0 day) were: 0.10, 0.12, 0.16 and 0.24 mg/kg. Meeting concluded that data were insufficient to recommend a maximum residue level.

Almond hulls

The residues of buprofezin in hulls from trials in accordance with the maximum US GAP for almond (2.26 kg ai/ha × 1, PHI 60 days) were: 0.07, 0.09, 0.15, 0.23, 0.25, 0.55, 1.76 mg/kg (n = 7).

The Meeting estimated a maximum residue level, STMR and highest residue of 2, 0.23 and 1.76 mg/kg respectively for almond hull.

The NAFTA calculator indicates 1.7 mg/kg (UCLMedian95th). The common practice of JMPR is to use one significant figure for maximum residue levels below 10 mg/kg. Rounding up the value to one significant figure results in 2 mg/kg which coincides with the recommendation of the Meeting.

Fate of residues during processing

The Meeting received information on the fate of incurred residues of buprofezin in apple, plum, cherry, olive and coffee under simulated processing conditions.

Processing factors were calculated for apple (juice and wet pomace), plums (prunes), cherries (juice and jam), grapes, olives (olive oil) and coffee (roasted coffee and freeze-dried coffee) and are shown in the table below. STMR-Ps were calculated for commodities for which maximum residue levels were estimated by the current Meeting using the respective STMR and processing factor and are shown in the following table together with processing factors.

Processing factors and STMR-Ps for apple, plums, cherries, grapes, olives and their processed commodities

Commodity	Median or best estimate of processing factor	STMR/ STMR-P, mg/kg
Apple		0.28
Apple juice	0.57	0.16
Apple wet pomace	2.0	0.56
Plums		0.155
Prunes	3.0	0.465
Cherries		0.73
Cherry juice	<0.17	0.12
Cherry jam	<0.17	0.12
Grape		0.17
Grape juice (pasteurized)	0.58	0.098
White wine	0.88	0.15
Red wine	0.60	0.10
Dried grapes	2.2	0.37

Apple wet pomace, prunes, dried grapes and olive oil are expected to contain higher residues than respective raw agricultural commodities.

Multiplying the STMR of apple found in the supervised trials by the processing factor of 2.0 and adjusting for a dry weight basis resulted in an STMR-P estimate of 1.4 mg/kg for apple wet pomace (dry basis). Since the recommended maximum residue level for apple was 3 mg/kg, no maximum residue level was necessary for apple pomace.

Multiplying the HR of plums found in the supervised trials (0.55 mg/kg) by the processing factor of 3.0 resulted in an HR estimate of 1.65 mg/kg for prunes. Since the recommended maximum residue level for plum was 2 mg/kg, no maximum residue level was necessary for prunes.

Multiplying the HR of grapes found in the supervised trials (0.74 mg/kg) by the processing factor of 2.2 resulted in an HR estimate of 1.63 mg/kg for dried grapes. The Meeting estimated a maximum residue level of 2 mg/kg for dried grapes.

Since the calculated STMR-P for olive oil was 3.49 mg/kg and the recommended maximum residue level for olive was 5 mg/kg, the residues of buprofezin in olive oil is covered by the maximum residue level for olive.

On the basis of the STMR and HR for peppers and the default dehydration factor of 7, an STMR and HR for chilli peppers (dry) were calculated to be 2.31 and 7.7 mg/kg respectively. Based on the HR, the Meeting recommended a maximum residue level for chili peppers (dry) at 10 mg/kg.

Residues of animal commodities

The Meeting estimated the dietary burden of buprofezin residues in farm animals from the diets listed in Annex 6 of the 2006 JMPR Report. Among commodities reviewed by the 2008 and current JMPR, almond hulls (STMR-P, 0.24 mg/kg), apple wet pomace (STMR-P, 0.56 mg/kg) and citrus pulp, dry (STMR-P, 1.2 mg/kg) can be fed to beef and dairy cattle. Poultry were not exposed to buprofezin through treated feed items evaluated by the 2008 and current Meeting.

The 2008 JMPR estimated a maximum and mean dietary burden of 0.40 ppm of dry matter diet for beef and dairy cattle in Australia. The current Meeting re-calculated animal dietary burden using almond hulls, apple wet pomace and citrus pulp, dry as shown in the table below.

Summary of livestock dietary burdens (ppm of dry matter diet)

	US-Canada		EU		Australia	
	max	mean	max	mean	max	mean
Beef cattle	0.28	0.28	0.28	0.28	0.40 ^a	0.40 ^a
Dairy cattle	0.14	0.14	0.26	0.26	0.40 ^b	0.40 ^b

^a Suitable for estimating maximum residue levels and STMRs for meat and edible offal.

^b Suitable for estimating a maximum residue level and STMRs for milk.

Since the maximum and mean animal dietary burdens calculated by the current Meeting were the same as those by the 2008 JMPR, the Meeting confirmed the maximum residue levels recommended by the 2008 JMPR for meat (from mammals other than marine mammals, edible offal (mammalian) and milks at 0.05 (*), 0.05 (*) and 0.01 (*) mg/kg respectively. It also confirmed that STMRs and HRs for these commodities were 0 mg/kg.

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 IEDI and IESTI assessment.

Plant commodities and animal commodities:

Definition of the residue for compliance with MRLs and for estimation of dietary intake:
buprofezin

Commodity		Recommended MRL, mg/kg		STMR/STMR-P	HR/HR-P
CCN	Name	New	Previous	mg/kg	mg/kg
AB 0660	Almond hulls	2	-	0.23	1.76
TN 0660	Almonds	0.05 (*)	-	0.05	0.05
FP 0226	Apple	3	-	0.28	0.99
JF 0226	Apple juice			0.16	-
	Apple wet pomace (dry weight basis)			1.4	-
FS 0013	Cherries	2	-	0.73	1.32
HS 0444	Peppers Chili, dried	10		2.31	7.7

Commodity		Recommended MRL, mg/kg		STMR/STMR-P	HR/HR-P
CCN	Name	New	Previous	mg/kg	mg/kg
VC 0424	Cucumber	W ^a	0.2		
VC 0045	Fruiting vegetables, Cucurbits	0.7	-	0.195	0.41
FB 0269	Grapes	1	-	0.17	0.74
	Grape juice			0.098	-
	White wine			0.15	-
	Red wine			0.10	-
DF 0269	Dried grapes	2		0.37	1.63
FS 0245	Nectarine	9	-	1.355	8.13
FT 0305	Olives	5	-	1.125	1.66
OR 0305	Olive oil			3.49	-
FS 0247	Peach	9	-	1.355	8.13
FP 0230	Pear	6	-	1.09	3.64
VO 0051	Peppers	2	-	0.33	1.1
FS 0014	Plums (including prunes)	2	-	0.155	0.55
DF 0014	Prunes			0.465	1.65
FB 0275	Strawberry	3	-	0.44	1.24

^a The previous recommendation is withdrawn to be replaced by a new maximum residue level for fruiting vegetables, Cucurbits.

DIETARY RISK ASSESSMENT

Long-term intake

The International Estimated Dietary Intakes (IEDIs) of buprofezin were calculated for the 13 GEMS/Food cluster diets using STMRs and STMR-Ps estimated by the 2008 and current Meeting (see Annex 3 of the 2009 JMPR Report). The ADI is 0–0.009 mg/kg bw and the calculated IEDIs were 150% of the maximum ADI. The Meeting concluded that the long-term intake of residues of buprofezin resulting from the uses considered by the current JMPR is unlikely to present a public health concern.

Short-term intake

The International Estimated Short-Term Intakes (IESTI) of buprofezin were calculated for food commodities and their processed commodities using HRs/HR-Ps or STMRs/STMR-Ps estimated by the current Meeting (see Annex 4 of the 2009 JMPR Report). The ARfD is 0.5 mg/kg and the calculated IESTIs were 0–30% of the ARfD for the general population and 050% of the ARfD for children. The Meeting concluded that the short-term intake of residues of buprofezin, when used in ways that have been considered by the JMPR, is unlikely to present a public health concern.

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