

PHOSMET (103)

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EXPLANATION

Phosmet was first evaluated in 1976, and most recently in 1997 for residues and in 1998 for toxicology (acute RfD). The 1997 JMPR recommended the withdrawal of the existing CXLs for, among other crops, blueberries, citrus fruits, nectarines, pears and potatoes. The 31st CCPR (1999) decided to retain the CXLs for four years under the Periodic Review Programme as the Committee was informed that information would be reported to support recommendations for all crops except feijoa and kiwifruit. Data to support the existing CXLs for blueberries, citrus fruits, pear, nectarines and tree nuts and other critical data required for the estimation of maximum residue levels were provided by the manufacturer.

The governments of Australia and The Netherlands reported information on national GAP and/or residue data.

RESIDUE ANALYSIS

No new information on methods of analysis was provided.

USE PATTERN

The information available to the Meeting on registered uses is summarized in Table 1.

Table 1. Registered uses of phosmet (pre-harvest, WP formulations).

Crop	Country	Application				PHI (days)
		Method	Rate (kg ai/ha)	Spray conc. (kg ai/hl)	No.	
Almonds	USA	Foliar	3.4 – 4.2		2	30
Blueberries	Canada	Foliar	1.1	0.11	1-2	15
Blueberries	USA	Foliar	1		1-2	3
Citrus	Argentina	Applied as a bait		0.06		
Citrus	Spain	Foliar		0.075-0.13		30
Citrus (orange, grapefruit), Florida only	USA	Foliar	0.8 – 1.6		5	7
Nectarine	Chile	Foliar	-	0.05-0.06		14
Nectarines	USA	Foliar	1.7 – 3.3			14
Pear	Canada	Foliar	1.9			1
Pear	Chile	Foliar	-	0.075-0.09		7
Pears	USA	Foliar	1.7 – 5.6	0.025-0.05		7

Crop	Country	Application				PHI (days)
		Method	Rate (kg ai/ha)	Spray conc. (kg ai/hl)	No.	
Pecans	USA	Foliar	1.6 – 2.5	0.05		14 ¹
Pistachios	USA	Foliar	3.4 – 4.4			14 ² CA only (before 10% hull split)
Pistachios	USA	Dormant spray	2.4-3.4			7 CA only
Walnuts, Filberts and other nuts	USA	Foliar	3.4 – 6.7		max. 5	14; (not after hull split)

¹ Do not graze or feed livestock on cover crops grown in treated pecan groves

² Do not graze or feed livestock on cover crops grown in treated pistachio groves

RESIDUES RESULTING FROM SUPERVISED TRIALS

The results of the residue trials are shown in Tables 2-13 and are reviewed in order of the Codex Alimentarius Classification of Foods and Animal Feeds.

Table 2	<i>Oranges.</i>
Table 3	<i>Mandarins.</i>
Table 4	<i>Grapefruit.</i>
Table 5	<i>Lemons.</i>
Table 6	<i>Pears.</i>
Table 7	<i>Nectarines.</i>
Table 8	<i>Blueberries.</i>
Table 9	<i>Almonds.</i>
Table 10	<i>Hazelnuts.</i>
Table 11	<i>Pecans.</i>
Table 12	<i>Pistachios.</i>
Table 13	<i>Walnuts.</i>

Where residues were not detected the results are reported as below the limit of quantification (LOQ), e.g. <0.05 mg/kg. Residues, application rates and spray concentrations have generally been rounded to 2 significant figures. Although trials included results for untreated controls, these results are not reported in the Tables unless the residues in the control samples were above the LOQ. The prefix “c” in the Tables indicates samples from control plots. Analyses of replicate field samples from one plot or from duplicate plots in one trial are shown separately. Double-underlined residues are from treatments according to GAP and were used to estimate maximum residue levels. Whenever possible residues are recorded uncorrected for analytical recoveries. It should be noted that unless stated otherwise concurrent recoveries were acceptable and corrections would not be significant.

Citrus fruit

Trials were on oranges, mandarins, grapefruit and lemons (Tables 2–5).

Oranges. Reported concurrent recoveries were 70-104% phosmet, 70-110% oxon, both generally >80%.

Table 2. Residues of phosmet in oranges after foliar applications of various formulations.

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no./comments
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
Grant and Meyers, 1992 (SAI 132-152 days)								
Concordia, Argentina, 1991, Valencia late	WP	0.5	0.06		6	7	0.32 (<0.05) whole 1.0 (<0.05) peel <0.05 (<0.05) pulp	RR92-045B
Concordia, Argentina, 1991, Valencia late	WP	0.5	0.06		6	7	0.13 (<0.05) fruit 0.60 (<0.05) peel <0.05 (<0.05) pulp	RR92-045B
Concordia, Argentina, 1991, Valencia late	WP	0.5	0.06		6	7	0.07 (<0.05) whole 0.27 (<0.05) peel <0.05 (<0.05) pulp	RR92-045B
Raga, 2000 (6 trees, motorised knapsack sprayer)								
Albalat de la Ribera, Valencia, Spain, 1999, Navel late ¹	WP	4.9	0.13	3947	1	0 30 ² 30 ² 30 30 30 30 30	2.9 (<0.01) whole <u>1.8</u> (<0.01) whole 1.7 (<0.01) whole 5.6 (0.02) peel 3.6 (<0.01) peel 0.52 (<0.01) pulp 0.27 (<0.01) pulp <u>0.11</u> (<0.01) juice	TRC-99-1 Plot size 108 m ²
Picassent, Valencia, Spain, 1999, Valencia late	WP	7.0	0.13	5625	1	0 30 ² 30 30 30	2.2 (<0.01) whole <u>0.57</u> (<0.01) whole 0.80 (<0.01) peel 0.09 (<0.01) pulp 0.22 (<0.01) juice	TRC-99-1 Plot size 150 m ² ,
Corbera, Valencia, Spain, 1999, Valencia late	WP	6.8	0.13	5424	1	0 30 ² 30 30 30 30	2.1 (<0.01) whole 0.41 (<0.01) whole 1.7 (<0.01) peel c0.74 (c<0.01) peel 0.06 (<0.01) pulp 0.40 (<0.01) juice	TRC-99-1 Plot size 132 m ²
Llanera de Ranes, Valencia, Spain 1999, Valencia late	WP	9.8	0.13	7844	1	0 30 ² 30 30 30	2.9 (<0.01) whole <u>0.73</u> (<0.01) whole 1.4 (<0.01) peel 0.15 (<0.01) pulp 0.46 (<0.01) juice	TRC-99-1 Plot size 45 m ²
Anon, 1999 (3 replicates of 8 trees)								
Puzol, Valencia, Spain, 1997, Valencia ³	WP	0.3	0.05	600	1	0 7 14 21 28 42 56	3.1, 3.4, 3.2 [2.4] 4.4, 3.1, 3.7 [3.1] 3.7, 2.9, 4.6 [2.2] 2.8, 2.1, 3.2 [2.2] 1.5, 2.2, 1.7 [2.0] 0.39, 0.44, 0.29 [1.6] 0.36, 0.36, 0.36 [0.89]	Doc ID. 430
Algemesi, Valencia, Spain, 1989, Navelina ³	WP	1.8	0.036	5000	1	0 7 14 21 28 42 56	0.14, 0.28, 0.29 [1.2] 0.12, 0.22, 0.19 [0.78] 0.14, 0.17, 0.17, [0.45] 0.15, 0.09, 0.09 [0.40] 0.09, 0.07, 0.05 [0.46] 0.09, 0.11, 0.11 [0.22] 0.07, 0.07, 0.09 [0.13]	Doc Doc ID. 430
Bellreguard, Valencia, Spain, 1986, Valencia Late ³	WP	1.6	0.036	4400	1	0 7 14 21 28 35 42	1.2, 1.3, 1.1 [0.33] 1.2, 1.1, 0.89 [0.31] 0.79, 0.72, 0.74 [0.25] 0.63, 0.62, 0.85 [0.22] 0.50, 0.53, 0.47 [0.22] 0.45, 0.41, 0.35 0.30, 0.34, 0.33	Doc ID. 430

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no./comments
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
Bellreguard, Valencia, Spain, 1986, Valencia ³	EC	2.6	0.06	4400	1	0	1.2, 1.2, 1.2 [0.34]	Doc ID. 430
						7	0.85, 1.0, 1.0 [0.21]	
						14	0.54, 0.68, 0.62 [0.20]	
						21	0.40, 0.53, 0.60 [0.05]	
						28	0.43, 0.39, 0.47 [0.04]	
						35	0.35, 0.38, 0.33	
42	0.21, 0.26, 0.27							
Lainco, 1995								
Lepe, Huelva, Spain, 1994, Valencia late	EC	6.0	0.12	5000	1	0 8 15 27	0.73 0.69 0.13 <u>0.10</u>	
Borriana, Castellón, Spain, 1994, Washington Navel	EC	5.7	0.12	4750	1	0 7 13 28	0.64 0.30 0.23 <u>0.05</u>	632-0415
Formentera de Segura, Alicante, Spain, 1994, Navelina	EC	7.2	0.12	6000	1	0 29	3.6 <u>0.36</u>	632-0415
Borriana, Castellón, Spain, 1994, Washington Navel	EC	3.0	0.12	2500		0 29	1.6 <u>0.32</u>	632-0415
Anon., 1974a								
Dinuba, California, USA, 1971, Navel	WP	17	0.09	1870 8	1	0 3 7	1.9 (<0.05) 2.2 (<0.05) 2.0 (<0.05)	632-0417 A-6309 Oscillating boom sprayer, SAI 18-25 days
Seville, California, USA, 1971, Navel	WP	5.6	0.06	9354	1	166	0.12 (<0.05) 0.17 (<0.05)	632-0417 A-5324 SAI 1 day
Seville, California, USA, 1971, Navel	WP	8.4	0.09	9354	1	173	0.28 (<0.05)	632-0417 A-6308 SAI 232 days
Seville, California, USA, 1971, Navel	WP	5.6	0.06	9354	1	173	0.26 (<0.05) 0.29 (<0.05)	632-0417 A-6308 SAI 232 days
Dinuba, California, USA, 1971, Navel	WP	17	0.09	1870 8	1	0 7	1.5 (<0.05) 0.87 (<0.05)	632-0417 A-5301 Speed sprayer SAI 286-293 days
Seville, California, USA, 1971, Navel	WP	8.4	0.09	9354	1	166	0.19 (<0.05)	632-0417 A-5324
Dinuba, California, USA, 1971, Navel	WP	6.7	0.7	935	1	0 7	0.9 (<0.05) 0.44 (<0.05)	632-0417 A-9145
Sanger, California, USA, 1971, Navel	WP	3.4	0.06	5612	1	10	0.64 (<0.05)	B-1736 632-0417
Sanger, California, USA, 1971, Navel	WP	5.0	0.09	5612		10	0.72 (<0.05)	plot size 8 trees; blower sprayer; SAI 336 days
Dinuba, California, USA, 1971, Navel	WP	11	1.2	935	1	8	0.28 (<0.05)	B-1740 632-0417 plot size 61 trees; concentrate sprayer; SAI 32 days
Dinuba, California, USA, 1971, Navel	WP	17	0.09	1870 8	3	0 (2 sprays)	0.88 (<0.05)	B-1742 632-0417

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no./comments
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
						0 3 7 14	0.78 (<0.05) 1.7 (<0.05) 1.5 (<0.05) 1.5 (<0.05)	plot size 3×10 trees; speed sprayer; SAI 142-157 days
Dinuba, California, USA, 1971, Navel	WP	15	0.09	1683 7	1	0 7 14 21	0.89 (0.21) 0.96 (0.67) 0.67 (0.18) 0.93 (0.24)	B-1737 632-0417 SAI 217-238 days
Dinuba, California, USA, 1974, Navel	WP	3.4	0.06	5612	4	7	0.47 (<0.05) immature fruit	A-8403 632-0417 boom sprayer; SAI 8 days
Seville, California, USA, 1971, Navel	WP	5.6	0.06	9354	1	166	0.17 (<0.05)	632-0417 A-5234
Seville, California, USA, 1971, Navel	WP	5.6	0.06	9354	1	173	0.25 (<0.05)	632-0417 A-6308
Dinuba, California, USA, 1974, Navel	WP	11	1.2	935.4	3	8	0.94 (<0.05)	632-0417 B-1740
Dinuba, California, USA, 1973, Navel	WP	6.7	0.7	935.4	3	0 7	1.4 (<0.05) 1.2 (<0.05)	A-9145 632-0417
Dinuba, California, USA, 1973, Navel	WP	6.7	0.7	935.4	3	0 7	0.90 (<0.05) 0.44 (<0.05)	concentrate sprayer; SAI 172-179 days
Sanger, California, USA, 1974, Navel	WP	9.0	0.06	1496 6	2	7 ⁴ 7	1.6 (<0.05) 3.6 (<0.05)	A-8398 632-0417 hand sprayer; 4 trees/plot; SAI 41-52 days
Sanger, California, USA, 1974, Navel	WP	16	0.07	2245 0	2	7 ⁴ 7	1.6 (<0.05) 4.0 (<0.05)	A-8399 632-0417 hand sprayer; 4 trees/plot; SAI 41-52 days
Suchek, 1992								
Brazil 1991	WP		0.1		5	14	<0.05 pulp	JMPR 1997
	SC		0.2		5	14	<0.05 pulp	JMPR 1997
	SC		0.1		5	14	<0.05 pulp	JMPR 1997
	SC		0.1		5	21	<0.05 pulp	JMPR 1997
	SC		0.2		5	14	<0.05 pulp	JMPR 1997
	SC		0.2		5	21	<0.05 pulp	JMPR 1997

SAI: sampling-to-analysis interval

¹ residues for same day and sample are from different laboratories² whole fruit residue calculated from residues in pulp and peel³ residues are from replicate plots, values in square brackets are composites of the 3 plots analysed by a different laboratory⁴ days after first application and before second application

Table 3. Residues of phosmet in mandarins after single foliar applications of WP and EC formulations.

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	Form	kg ai/ha	kg ai/hl	l/ha			
Raga, 2000							
cacer, Valencia, Spain, 1999, Fortuna ¹	WP	4.8	0.13	3810	0 0 30 ² 30 30 30 30	2.5 (<0.01) whole 1.4 (<0.01) whole <u>1.0</u> (<0.01) whole 3.8 (0.02) peel 6.0 (0.04) peel 0.17 (<0.01) pulp 0.21 (<0.01) pulp	TRC-99-1 plot size 126 m ² ; 6 trees; motorised knapsack sprayer

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	Form	kg ai/ha	kg ai/hl	l/ha			
Albalat de la Ribera, Valencia, Spain, 1999, Clemenvilla	WP	3.8	0.13	3016	0 7 15 21 30 ² 30 30	2.5 (<0.01) whole 1.8 (<0.01) whole 1.5 (<0.01) whole 1.1 (<0.01) whole <u>0.90</u> (<0.01) whole 3.7 (0.02) peel 0.12 (<0.01) pulp	TRC99-1 plot size 63 m ² ; 6 trees; motorised knapsack sprayer
Turis, Valencia, Spain, 1999, Clemenules	WP	6.3	0.13	5000	0 7 14 21 30 ² 30 30	2.7 (<0.01) whole 1.5 (<0.01) whole 1.6 (<0.01) whole 1.2 (0.01) whole <u>1.4</u> (<0.01) whole 5.0 (0.02) peel 0.33 (<0.01) pulp	TRC99-1 plot size 41 m ² ; 6 trees; motorised knapsack sprayer
Onda, Castellón, Spain, 1999, Hernandina	WP	4.1	0.13	3281	0 7 14 21 30 ² 30 30	2.8 (0.03) whole 2.8 (0.05) whole 2.1 (0.04) whole 1.8 (0.05) whole <u>1.6</u> (0.03) whole 5.7 (0.13) peel 0.30 (<0.01) pulp	TRC99-1 plot size 41 m ² ; 6 trees; motorised knapsack sprayer
Anon., 1999							
Puzol, Valencia, Spain, 1996, Clementules ³	WP	1.3	0.13	1000	0 7 14 21 28 42 54	4.8, 2.1, 2.5 [2.8] 3.1, 4.5, 3.5 [1.9] 1.7, 1.8, 2.0 [1.3] 1.5, 1.3, 1.5 [0.71] 1.4, 1.0, 0.94 [0.60] <u>1.5</u> , 0.61, 1.1 [0.32] 0.92, 0.76, 1.2 [0.35]	Doc ID 430 3 replicates of 8 trees
Puzol, Valencia, Spain, 1997, Clementina de Nules	WP	0.5	0.05	1000	0 7 14 21 28 42 56	1.5 0.91 0.86 0.64 0.82 0.18 0.11	Doc ID 430 3 replicates of 8 trees
Lainco, 1995							
Borriana, Castellón, Spain, 1994, Tangerine, Marisol	EC	1.2	0.12	1000	0 7 14 29	3.1 1.7 0.71 <u>0.67</u>	632-0415
Formentera de Segura, Alicante, Spain, 1994, Tangerine Clementina de Nules	EC	5.4	0.12	4200	0 8 14 29	3.9 1.2 1.2 <u>0.61</u>	632-0415
Borriana, Castellón, Spain, 1994, Tangerine, Clementina de Nules	EC	7.2	0.12	6000	0 29	1.8 <u>0.09</u>	632-0415
Borriana, Castellón, Spain, 1994, Tangerine, Fortune	EC	4.8	0.12	4000	0 29	2.2 <u>0.47</u>	632-0415

¹ residues reported for same day and sample are from different laboratories

² whole fruit residue calculated from residues in pulp and peel

³ residues are from replicate plots, values in square brackets are composites of 3 plots analysed by a different laboratory

Grapefruit. Analytical recoveries at 0.05 mg/kg of phosmet were 70-104% and of oxon 70-106% with a single value of 118%.

Table 4. Residues of phosmet in grapefruit after two foliar applications of WP formulations in the USA, 1972 (Anon., 1972a).

Location, year, variety	Application			PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha			
Highlands, California, grapefruit	11	0.06	18708	0	1.5 (<0.05)	A-6314, B-2314 632-0005 power sprayer; 5 trees/plot; SAI 51-76 days
				3	2.6 (<0.05)	
				7	1.9 (<0.05)	
				14	1.3 (<0.05)	
Welaco, Texas, Ruby Red	6.7	0.12	5612	0	0.33 (<0.05)	A-5556, A-5557, A-5553, A-5558, 632-0005 tractor mounted sprayer; 5 trees/plot; SAI 60-95 days
				3	0.35 (<0.05)	
				7	0.61 (<0.05)	
				14	0.34 (<0.05)	
Highlands, California, grapefruit	11	0.3	3742	7	4.0 (<0.05) whole 6.4 (0.09) peel <0.05 (<0.05) pulp	A-6862 632-0005 power sprayer; 6 trees/plot; SAI 61-100 days

Table 5. Residues of phosmet in lemons (Lisbon variety) after foliar applications of WP formulations in US trials (Anon., 1974b).

Location, year, variety	Application				PHI (days)	Phosmet (mg/kg)	Report no.
	kg ai/ha	kg ai/hl	l/ha	No			
Dinuba, California, 1970	15	0.1	16873	1	0	1.5 (0.57)	632-0111 B-1738
					7	1.2 (0.08)	
					14	0.73 (0.12)	
					21	0.96 (0.20)	
Dinuba, California, 1972	11	1.2	935	3	8	2.7 (<0.05)	632-0111 B-1741
Dinuba, California, 1972	11	0.6	18708	3	-1*	<0.05 (<0.05)	632-0111 B-1743
					0	1.3 (<0.05)	
					3	1.1 (<0.05)	
					7	1.2 (<0.05)	
					14	0.76 (<0.05)	
Dinuba, California, 1974	3.4	0.06	5612	2	7	0.20 (<0.05)	632-0111 A-8404

* Sample collected 1 day before 3rd spray and 54 days after 2nd spray

Pome fruit.

In trials on pears (Table 6) recoveries of phosmet were 80-117% and of oxon 85-104%, except in two UK trials as noted.

Table 6. Residues of phosmet in pears after foliar applications of WP formulations.

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Anon., 1968a							
Yakima, Washington, USA, 1965, Bartlett	2.2	0.04	5612	3	0 7 14 21	6.8, 4.0 3.8, 4.5 3.5, 3.0 2.2, 2.5	632-2101 A-910
Watsonville, California, USA, 1965, Hardy	5.6	0.12	4677	2	1 8 15 22	2.6, 2.2 <u>1.8</u> , 1.6 1.3, 0.95 0.78, 0.63	632-2101 A-1412
Yakima, Washington, USA, 1965	9.0	0.12	7483	2	1 7 14 21	1.6 1.2 0.84 0.71	632-2101 A-1663
Yakima, Washington, USA, 1965	18	0.24	7483	3	1 7 14 21	2.4 1.2 1.0 0.60	632-2101 A-1663
Odell, Oregon, USA, 1965	11	0.24	4677	1	1 8 15 22	3.4 1.6 2.4 0.99	632-2101 A-1668
Ontario, New York, 1965, Bartlett	4.5	0.12	3742	1	0 7 13 20	4.3 (0.10) <u>1.7</u> (<0.05) 0.83 (0.10) 0.56 (<0.05)	632-2101 A-1979
Ganges, Michigan, USA, 1965, Bartlett	3.4	0.09	3742	3	1 7 21 21	1.4 1.1 <0.4 0.85	632-2101 A-2035, A-2039
St Catherines, Ontario, Canada, 1965, Bartlett	4.5	0.1	4675	2	1 7 14 21	2.3 (<0.05) c0.22 (<0.05) 0.84 (<0.05) 0.69 (<0.05) 0.52 (<0.05)	632-2101 A-1989
Yakima, Washington, USA, 1967	2.4	0.03- 0.04	5612- 7483	3	9	0.27 (0.21), 0.25 (0.15)	A-1363 632-2101 SAI 282 days
Anon., 1974c							
Wenatchee, Washington, USA, 1967, Bartlett	6.3	0.08	7483	3	0 7 14	3.4 (<0.05) <u>1.3</u> (<0.05) 0.45 (<0.05)	A-6907 632-2102 handgun
Odell, Oregon, USA, 1970, Bartlett/Anjou	4.5	0.11	4209	1	37	<0.05 (<0.05)	632-2102 B-0092 Bean speed sprayer SAI 387 days, 78 trees/plot, 2 replicates
Odell, Oregon, USA, 1970, Bartlett/Anjou	5.6	0.12	4677	1	56	<0.05 (<0.05)	632-2102 B-0095
Vineland, Ontario, Canada, 1964, Bartlett	3.4			3	1 7 14 28	1.9 0.65 0.26 0.1	632-2102 4515
Kent, England, 1970	1.1			2	36	0.22 (<0.05)	632-2102 B-1532 SAI 205 days

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Kent, England, 1970	2.2			2	36	0.25 (<0.05)	632-2102 B-1532
Anon., 2001a							
Los Niches, Curicó, Chile, 2001, Abate Fetel ¹	4.5	0.22	2000	3	7	1.6 (<0.1), 1.64 (<0.1)	632-2103 Two replicates of 5 trees; traditional system
Lo Herrera, Chile, 2001, Packhams Triumph ¹	4.5	0.22	2000	3	7	2.4 (<0.1), 2.8 (<0.1)	
Lo Herrera, Chile, 2001, Bosc ¹	4.5	0.22	2000	3	7	4.4 (0.13), 3.9 (0.14)	
Quina de Tilcoco, Chile, 2001, Bonna Luisa ¹	4.5	0.22	2000	3	7	4.8 (<0.1), 4.2 (<0.1)	
Chillán s7n, San Fernando, Chile, 2001, Beurre Bosc ¹	4.5	0.18	2500	3	7	6.9 (0.12), 7.0 (0.11)	

¹ residues are from replicate plots

Stone fruit.

In trials on nectarines (Table 7) procedural recoveries of phosmet were 72-120% (3 outside 90-103%) and of oxon 73-116% (3 outside 87-111%).

Table 7. Residues of phosmet in nectarines after foliar applications of WP formulations.

Location, year, variety	Application				PHI (days)	Phosmet (mg/kg)	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Anon., 1968b							
California, USA, 1967	8.4	0.18	4677	1	31	0.22 (<0.1)	632-3201 A-0231, A-0233 hand gun SAI 294 days
California, USA, 1967	8.4	0.18	4677	2	36	0.39 (<0.1)	
California, USA, 1967	8.4	0.18	4677	2	29	0.35 (<0.1)	
Langer, California, USA, 1968	3.4-4.2				0 7 14 21	4.0 (<0.1) 2.3 (<0.1) 0.55 (<0.1) <0.1 (<0.1)	632-3201 B-1090speed sprayer (air-blast); 4 trees/replicate, 4 replicates; SAI 66 days
Anon., 1973a							
Kingsburg, California, USA, 1970, Regal Grand	2.8	1.7	168	1	0 3 14 7	105 (0.25) foliage 91 (0.31) foliage 44 (0.44) foliage 0.71 (<0.05) immature fruit c0.85 (0.13) foliage	632-3203 B-0139 Econ-o- mist concentrate sprayer; 3 0.4 ha plots, 3 replicates
Kingsburg, California, USA, 1970	2.8	1.7	168	1	48	0.08 (<0.05)	632-3203 B-1851 commercial low volume sprayer; SAI 11 days
Anon., 1965							
Sanger, California, USA, 1965, September Grands	4.5	0.11	3742	1	3 9 16 25	0.67 0.81 4.6 0.2	632-3202 A-1734
Anon., 2001b							
San Bernardo, Chile, 2001, August-Glo ¹	3.3	0.17	2000	3	14	2.4 (<0.15), 2.5 (<0.15)	632-3204 Two replicates of 5 trees
Buin Fundo San José, Chile, 2001, Flame Kist ¹	3.3	0.17	2000	3	14	2.5 (<0.15), 2.4 (<0.15)	

Location, year, variety	Application				PHI (days)	Phosmet (mg/kg)	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Graneros, Chile, 2001, Flame Kist ¹	3.3	0.17	2000	3	14	3.8 (<0.15), 3.6 (<0.15)	
Graneros, Chile, 2001, September Red ¹	3.3	0.17	2000	3	14	2.4 (<0.15), 2.5 (<0.15)	

¹ residues are from replicate plots

Berries

Trials were conducted on blueberries in the USA. Analytical recoveries of phosmet were $102 \pm 8.9\%$ (lowest level 0.05 mg/kg) and of oxon $133 \pm 23.6\%$ (lowest level 0.1 mg/kg)

Table 8. Residues of phosmet in blueberries after foliar applications of WP and 5D formulations in the USA.

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
Ourisson, 1997								
Jonesboro, Maine, 1994, wild ¹	WP	1.1	0.48, 0.48, 0.48, 0.47, 0.48	232, 227, 230, 236, 231	5	3	12 (0.18), 7.7 (0.17) mean <u>9.9</u> (0.18)	IR-4 05397 632-4401 30×23 m; 0.15-0.3 m high; foliar mist (pneumatic sprayer); SAI 323-326 days
Chatsworth, New Jersey, 1994, Bluecrop ¹	WP	1.0	0.04	233, 9	5	4	3.8 (0.16), 3.0 (0.10) mean <u>3.4</u> (0.13)	IR-4 05397 632-4401 8 bushes 1-1.5 m high; backpack with handgun (CO ₂ pressured); SAI 360 days
Castle, Hayne, North Carolina, 1994, Croatan ¹	WP	1.0	0.10	102, 9	5	3	4.5 (0.25), 3.5 (0.11) mean <u>4.0</u> (0.18)	IR-4 05397 632-4401 3×24 m; 0.9-1.2 m high; backpack with handgun, (CO ₂ pressured) SAI 361-401 days
Live Oak, Florida, 1995, Sharpeblue ¹	WP	1.1	0.52	215, 1	5	3	2.7 (0.11), 2.1 (<0.1) mean <u>2.4</u> (<0.11)	IR-4 05397 632-4401 3.7×12 m; 0.9-1.5 m high; handgun (air pressured); SAI 66 days
Douglas, Michigan, 1994, Jersey ¹	WP	1.1	0.24	463	5	3	4.2 (0.15), 3.8 (<0.1) mean <u>4.0</u> (<0.13)	IR-4 05397 632-4401 13×15 m; 1.2 m high; airblast SAI 315-323 days
Allen, Washington, 1994, Bluecrop ¹	WP	1.1, 1.0, 1.1, 0.93, 1.0	0.32	343, 324, 335, 291, 313	5	3	<u>1.3</u> (<0.10), 0.76 (<0.10) mean <u>1.0</u> (<0.10)	IR-4 05397 632-4401 61×3.3 m; 0.3-0.9 m high; backpack with boom (CO ₂ pressured); SAI 339-346 days
Anon., 1974d								
New Jersey	WP	0.56	0.06	935	2	1, 3, 5, 7, 14	4.7 (all total res) 1.0 0.85 0.68 0.41	632-4402 I-23-SK-71
New Jersey	WP	0.84	0.09	935	2	1, 3, 5	7.8 (all total res) <u>5.8</u> 2.8	632-4402 I-23-SK-71

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
						7	3.4 0.45	
New Jersey	WP	1.1	0.12	935	1	0 1 3 7	1.4 (all total res) 1.1 <u>3.7</u> 0.02	632-4402 B-1814
New Jersey	WP	1.1			4	47	0.06 (all total res)	632-4402 B-0621
New Jersey	WP	1.1			5	3	<u>6.6</u> (all total res)	632-4402 B-0621
New Jersey	WP	0.56	0.06	935	2	0 1 3 6 10 14 21	34 (all total res) 2.8 2.3 0.80 0.93 0.17 0.06	632-4402 B-0502
Oregon	WP	1.1				31	0.07 (all total res)	632-4402 A-6922
Oregon	WP	2.2				31	0.10 (all total res)	632-4402 A-6922
Oregon	WP	4.5				31	0.18 (all total res)	632-4402 A-6922
Maine	5D	1.1				21 24	0.04 (all total res) 0.02	632-4402 B-6004-1
Maine	5D	1.1				28	0.02 (all total res)	632-4402 B-0598

¹ replicate analyses

Tree nuts

Trials were on almonds, hazelnuts, pecans, pistachios and walnuts, all in the USA (Tables 9-13).

Almonds. Recoveries were generally within about 80-100%, with extremes of 70-120% for phosmet and 74-113% for the oxon.

Table 9. Residues of phosmet in almonds after foliar applications of WP formulations in the USA.

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Anon., 1977							
Bakersfield, California, 1976, Non-pariel ¹	3.4	0.09	3742	2	86	2.7 (<0.05), 4.0 (<0.05) hulls c0.1 (<0.05) hulls <u>≤0.05</u> (<0.05), <0.05 (<0.05) kernels	632-1001 A-11673 air blast sprayer; plot size 8 ha; approx 10% hull split at second spray
Turlock, California, 1976, Non-pariel Merced	4.5	0.12	3742	2	40	0.94 (<0.05) hulls c1.7 (<0.05) hulls <u>≤0.05</u> (<0.05) kernels	632-1001 A-12167 air blast sprayer; plot size 8 ha; approx 10% hull split at second spray, SAI 6 days
Ballico, California, 1976, Neplus, Jordanolas	4.5	0.12	3742	2	50	3.7 (<0.05) hulls c1.7 (<0.05) hulls <u>≤0.05</u> (<0.05) kernels	632-1001 A-12168 air blast sprayer; plot size 8 ha;

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
							approx 10% hull split at second spray,
Ripon, California, 1976, Neplus, Non- pariel, Merced	3.4	0.11	3115	1	77	6.7 (0.24) hulls <u><0.05</u> (<0.05) kernels	632-1001 A-14052 air blast sprayer; plot size 6 ha; approx 10% hull split at second spray, SAI 129 days
Ripon, California, 1976, Neplus, Non- pariel, Merced	3.4	0.11	3115	2	18	8.5 (0.49) hulls <0.05 (<0.05) kernels	632-1001 A-14052
Ripon, California, 1976, Neplus, Non- pariel, Merced	3.4	0.11	3115	1	77	8.3 (0.17) hulls <u>0.13</u> (<0.05) kernels	632-1001 A-14052
Ripon, California, 1976, Neplus, Non- pariel, Thompson	3.4	0.15	2239	1	84	2.5 (0.23) hulls <u><0.05</u> (<0.05) kernels	632-1001 A-14053 air blast sprayer; plot size 4.8 ha; approx 10% hull split at second spray, SAI 155 days
Ripon, California, 1976, Neplus, Non- pariel, Thompson	3.4	0.15	2239	2	21	2.8 (0.4) hulls <u>0.05</u> (<0.05) kernels	632-1001 A-14053
Ripon, California, 1976, Neplus, Non- pariel, Thompson	3.4	0.15	2239	1	21	0.44 (<0.05) hulls <u>0.07</u> (<0.05) kernels	632-1001 A-14053
Centerville, California, 1969, Texas	2.2	0.07	3742	1	45	4.8 (0.64) hulls <0.05 (<0.05) kernels	632-1001 B-0670 airblast sprayer SAI 894-914 days
Empire, California, 1970, Mission, Non- pariel	2.8	0.06	4677	1	24	0.98 (<0.05) hulls <0.05 (0.05) kernels	632-1001 B-1720, B-1723 4 replicate plots of 4 trees; SAI 399-407 days
Ballico, California, 1970, Non-pariel	2.8	0.06	4677	1	24	4.48 (0.25) hulls 0.06 (<0.05) kernels c0.06 (<0.05) kernels	
Winton, California, 1970, Mission, Non- pariel	2.8	0.06	4677	1	23	3.1 (<0.05) hulls <0.05 (<0.05) kernels	632-1001 B-1724 plot size 2 trees of each variety; hand sprayer; SAI 410 days
Atwater, California, 1970, Mission, Non- pariel	3.4	0.06	5612	1	24	2.3 (0.12) hulls <u>0.05</u> (<0.05) kernels	632-1001 B-1725 plot size 2 trees of each variety; hand sprayer; SAI 402-415 days
Fresno, California, 1968	2.2	0.06	3742	1	104	<0.05 (<0.05) nuts	632-1001 B-1066 3 replicate plots of 4 trees; SAI 1259 days
Sanger, California, 1969	3.4	0.06	5612	1	105	0.96 (0.12) hulls <u><0.05</u> (<0.05) kernels	632-1001 B-0666 airblast sprayer, 3 replicate plots of 20 trees, SAI 787 days
Sanger, California, 1969	2.8	0.06	4677	1	104	0.05 (0.31) hulls <0.05 (<0.05) kernels	632-1001 B-0667 hand gun sprayer, 3 replicate plots of 6 trees, SAI 894-923 days
Madera, California,	2.8	0.06	4677	1	105	4.0 (1.6) hulls	632-1001

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
1969						<0.05 (<0.05) kernels	B-0668 hand gun sprayer, 3 replicate plots of 4 trees, SAI 744-765 days
McFarland, California, 1973, Non-pariel, Merced ¹	3.4	0.8	421	1	18 18 27 27	1.5 (0.05), 1.2 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 2.0 (<0.05), 0.50 (<0.05) hulls <u><0.05</u> (<0.05), <0.05 (<0.05) kernels	632-1001 A-7983 airblast sprayer; plot size 2 rows of 12 trees SAI 99-108 days
Anon., 1983							
Wasco, California, 1982 ¹	4.5	0.4	1029	1	0 0 3 3 7 7 14 14	6.5 (<0.05), 4.3 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 9.0 (<0.05), 0.07 ² (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 7.6 (<0.05), 10.6 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 8.6 (0.16), 5.4 (0.09) hulls <0.05 (<0.05), <0.05 (<0.05) kernels c4.07 (0.12) hulls	A-21586 632-1002 2 replicates of 5.6 ha, ca 220 trees/ha. SAI 209-223 days
Wasco, California, 1982 ¹	4.5	4	112 (aerial)	1	0 0 3 3 7 7 14 14	1.6 (<0.05), 4.0 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 6.4 (<0.05), 1.4 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 4.6 (<0.05), 3.4 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 6.5 (<0.05), 2.4 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels c4.1 (0.12) hulls	A-21586 632-1002
Famosa, California, 1982 ¹	4.5	0.4	1029	1	0 0 3 3 7 7	8.0 (<0.05), 6.7 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 13 (<0.05), 3.2 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels 4.7 (<0.05), 9.0 (<0.05) hulls <0.05 (<0.05), <0.05 (<0.05) kernels	A-21588 632-1002 2 replicates 2.8 ha, 220 trees/ha, SAI 208-222 days

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
					14	4.7 (0.13), 7.0 (0.16) hulls	
					14	<0.05 (<0.05), <0.05 (<0.05) kernels c4.1 (0.12) hulls	
Famosa, California, 1982 ¹	4.5	4	112 aerial	1	0	7.4 (<0.05), 10.1 (<0.05) hulls	A-21588 632-1002
					0	<0.05 (<0.05), <0.05 (<0.05) kernels	
					3	8.8 (0.08), 4.5 (<0.05) hulls	
					3	<0.05 (<0.05), <0.05 (<0.05) kernels	
					7	4.2 (<0.05), 14 (0.15) hulls	
					7	<0.05 (<0.05), <0.05 (<0.05) kernels	
					14	2.9 (<0.05), 2.5 (<0.05) hulls	
					14	<0.05 (<0.05), <0.05 (<0.05) kernels c4.1 (0.12) hulls	

¹ residues are from replicate plots

² mislabelling suspected

Hazelnuts. Analytical recoveries were 72-94% of phosmet and 78-120% of the oxon.

Table 10. Residues of phosmet in hazelnuts (filberts) after foliar applications of WP and 5D phosmet formulations in the USA (Anon., 1972b).

Location, year, variety	Application					PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	Form	kg ai/ha	kg ai/hl	l/ha	No.			
Salem, Oregon, 1971	WP	3.4	0.06	5612	2	102	<0.05 (<0.05)	A-5233 632-1301 SAI 56 days
Salem, Oregon, 1971	WP	5.0	0.09	5612	2	102	<u><0.05</u> (<0.05)	A-5233 632-1301
Eugene, Oregon, 1971	WP	3.9	0.12	3274	2	63	0.06 (<0.05)	A-5242 632-1301 hand gun; SAI 120 days
Hillsboro, Oregon, 1970	WP	5.9	0.09	6548	2	62	<u><0.05</u> (<0.05)	B-0083 632-1301 SAI 482 days
Hillsboro, Oregon, 1970	WP	5.9	0.09	6548	2	62	<u><0.05</u> (<0.05)	B-0084 632-1301 SAI 482 days
Eugene, Oregon, 1970	WP	1.1	0.06	1964	1	76	<0.05 (<0.05)	B-0686 632-1301 SAI 473 days
Eugene, Oregon, 1971	5D	2.8	0.09	3274	2	63	<0.05 (<0.05)	A-5242 632-1301 hand duster; SAI 120 days
Eugene, Oregon, 1970	5D	3.4	0.17	1964	1	76	<0.05 (<0.05)	B-0686 632-1301 SAI 473 days

Pecans. Analytical recoveries: phosmet 72-107%, oxon 76-118%.

Table 11. Residues of phosmet in pecans after foliar applications of WP formulations in the USA, (Anon., 1972c).

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Monticello, Florida, 1968, Mahan	0.62×3 1.2×4	0.12×3 0.23×4	514	7	77	<0.1 (<0.1) nuts	A-2675 632-1101 plot size 4 trees/treatment with 4 replicates; SAI 21 days
Opp, Alabama, 1971, Schley	1.0	0.09	1122	10	14	<0.05 (<0.05) nuts	A-5361 632-1101 speed sprayer; SAI 159 days
Hamilton, Texas, 1971	2.0	0.09	2245	2	15	<u>0.09</u> (<0.05) kernels	A-5576 632-1101 SAI 104 days
Fitzgerald, Georgia, 1971, Schley, Stuart	1.1	0.3	374	5	10	0.11 (<0.05) kernels	A-6189 632-1101 concentrate sprayer; 3 x 5-6 trees; SAI 173 days
Tifton, Georgia, 1971	0.84	0.22	374	5	66	<0.05 (<0.05) kernels	A-6192 632-1101 concentrate sprayer; 4x6 trees; SAI 78 days
Monticello, Florida, 1971, Mahan	2.0	0.09	2245	4	14	<u>≤0.05</u> (<0.05) kernels	A-6200 632-1101 speed sprayer; 5 x 1 tree; SAI 174 days
Clemson, South Carolina, 1971, Stuart	1.3	0.5	258	6	15	<0.05 (<0.05) kernels	A-6203 632-1101 concentrate sprayer; 5x1 tree; SAI 172 days
Irvington, Alabama, 1968, Stuart	1.2	0.12	1010	3	25	<0.05 (<0.05) kernels	B-0196 632-1101 speed sprayer; 32 trees; SRI 34 days
Floral, Alabama, 1968	0.18	0.12	150	10	14	<0.05 (<0.05) kernels	B-0209 D94 632-1101
College Station, Texas, 1970, Mahan		0.06		2	0 6 13 44	<0.05 (<0.05) <0.05 (<0.05) 0.05 (<0.05) <0.05 (<0.05) kernels	B-1366 D95 B-1367 B-1368 B-1369 632-1101
Monticello, Florida, 1970, Mahan	4.0	0.18	2245	4	57	<0.05 (<0.05) kernels	B-2055 D96 632-1101
Floral, Alabama, 1971, Stuart	1.6	0.06	2713	8	14 29	<u>≤0.05</u> (<0.05) kernels <0.05 (<0.05) kernels	B-2065 D97 632-1101

Pistachios. Recoveries of phosmet were 70-78% from kernels and 68-70% from hulls except for one recovery of 112%. Recoveries of the oxon were 68-100% from kernels and 100% from hulls.

Table 12. Residues of phosmet in pistachios after single foliar applications of WP formulations in the USA (Anon., 1979).

Location, year, variety	Application			PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha			

Location, year, variety	Application			PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha			
Wasco, California, 1978, Kerman	4.5	0.14	3274	0	21 (<0.05) hulls	A-10742 632-1902 air fan sprayer; SAI 198 days
				0	<0.05 (<0.05) kernels	
				3	17 (<0.05) hulls	
				3	<0.05 (<0.05) kernels	
				7	15 (<0.05) hulls	
				7	<u><0.05</u> (<0.05) kernels	
				10	13 (<0.05) hulls	
				10	<0.05 (<0.05) kernels	
				14	10 (<0.05) hulls	
				14	<0.05 (<0.05) kernels	
Wasco, California, 1978, Kerman	4.5	0.14	3274	17	0.52 (<0.05) shell <u><0.05</u> (<0.05) kernels	A-10746 632-1902
Wasco, California, 1978, Kerman	4.5	0.14	3274	5	4.8 (<0.05) hulls	A-10745 632-1902 2 x 4 ha plots, 510 trees/ha; air fan sprayer; SAI 197-230 days
				5	<0.05 (<0.05) kernels	
				10	5.6 (<0.05) hulls	
				10	<0.05 (<0.05) kernels	
				15	4.4 (<0.05) hulls	
				15	<u><0.05</u> (<0.05) kernels	
				21	2.2 (<0.05) hulls	
				21	<0.05 (<0.05) kernels	
Wasco, California, 1978, Kerman	4.5	0.14	3274	38	0.072 (<0.05) hulls <0.05 (<0.05) kernels	A-10744 632-1902 air fan sprayer; SAI 183 days
Wasco, California, 1978, Kerman	4.5	0.14	3274	0	5.3 (<0.05) hulls	A-10743 632-1902 2 x 4 ha plots, 510 trees/ha; air fan sprayer; SAI 151-155 days
				0	<0.05 (<0.05) kernels	
				5	4.3 (<0.05) hulls	
				5	<0.05 (<0.05) kernels	
				10	3.8 (<0.05) hulls	
				10	<0.05 (<0.05) kernels	
				15	2.7 (<0.05) hulls	
				15	<u><0.05</u> (<0.05) kernels	
				21	3.7 (<0.05) hulls	
				21	<0.05 (<0.05) kernels	
Fresno, California, 1978, Kerman	4.5	0.18	2507	21	3.7 (<0.05) hulls <0.05 (<0.05) kernels	A-12420 632-1902 1 tree/plot; CO ₂ hand sprayer; SAI 183-186 days
Fresno, California, 1978, Kerman	9.0	0.36	2507	21	8.4 (<0.05) hulls 0.07 (<0.05) kernels	A-12420 632-1902 1 tree/plot; CO ₂ hand sprayer; SAI 226-239 days
Fresno, California, 1978, Kerman	4.5	0.18	2507	21	11 (<0.05) hulls <0.05 (<0.05) kernels	A-12419 632-1902 1 tree/plot; CO ₂ hand sprayer; SAI 226-239 days
Reedley, California, 1978, Kerman	4.5	0.18	2507	21	4.7 (<0.05) hulls <0.05 (<0.05) kernels	A-12423 632-1902 1 tree/plot; CO ₂ hand sprayer; SAI 217-219 days
Fresno, California, 1978, Kerman	4.5	0.18	2507	21	6.1 (<0.05) hulls <0.05 (<0.05) kernels	A12422 632-1902 1 tree/plot; CO ₂ hand sprayer; SAI 217-219 days

Walnuts. Recoveries from walnut kernels (Table 13) were 70-104%, with two at 65%, of phosmet and 78-107% of the oxon.

Table 13. Residues of phosmet in walnuts after foliar applications of WP formulations. Kernels analysed.

Location, year, variety	Application				PHI (days)	Phosmet and (oxon), mg/kg	Report no.
	kg ai/ha	kg ai/hl	l/ha	No.			
Dykeman, 1995							
Tulare, California, 1994, Chandler ¹	6.7×4	0.12	5575	5	14	<0.05 (<0.05), <0.05 (<0.05), <u>0.06</u> (<0.05)	94028-GOWN, 632- 1901 Plot size 6.4x73m 3 subplots x 2 trees; tractor mounted airblast sprayer; SAI 12-12.5 weeks
	6.9		5556				
			5575				
			5706				
				27	<0.05 (<0.05) ×3		
Anon., 1973b							
Salem, Oregon, 1971, Ashley	3.4	0.06	5612	2	102	<0.05 (<0.05)	A-5232 632-1201 SAI 93 days
Salem, Oregon, 1971, Ashley	5.0	0.09	5612	2	102	<0.05 (<0.05)	A-5232 632-1201
Butte City, California, 1971, Ashley	5.6	0.6	935	1	62	<0.05 (<0.05)	A-5262 632-1201 SAI 84 days
Gustine, California, 1971, Payne	2.2	0.07	3274	2	100	<0.05 (<0.05)	A-5266 632-1201 John Bean speed sprayer; SAI 19 days
Gustine, California, 1971, Payne	2.2	0.06	3742	2	84	<0.05 (<0.05)	A-5270 632-1201 Hardie dual fan speed sprayer; SAI 40 days
Patterson, California, 1971, Payne	2.2	0.06	3742	1	150	<0.05 (<0.05)	A-5271 632-1201 Aerofan sprayer; SAI 103 days
Butte City, California, 1971, Ashley ¹	5.6	0.6	935	2	85	<0.05 (<0.05), <0.05 (<0.05)	A-5278 632-1201 SAI 96 days
Linden, California, 1971, Payne ²	2.2	0.1	2339	2	153	<0.05 (<0.05), <0.05 (<0.05)	A-5279 632-1201 John Bean speed sprayer; SAI 110 days
Linden, California, 1971, Payne ²	2.8	0.12	2339	1	146	<0.05 (<0.05), <0.05 (<0.05)	A-5280 632-1201 speed sprayer; SAI 40 days
Gustine, California, 1971, Payne	2.2	0.07	3274	2	124	<0.05 (<0.05)	A-5283 632-1201 John Bean speed sprayer; SAI 93 days
Tulare, California, 1972, Payne	9.0	0.06	1515 3	1	79	<0.05 (<0.05)	A-7752 632-1201 hand gun; SAI 203 days
Visalla, California, 1972	2.8	0.06	4677	1	7 14	<0.05 (<0.05) <0.05 (<0.05)	B-1739 632-1201 SAI 477-484 days

¹ residues are from replicate plots

² not specified whether replicate plots or replicate analyses

FATE OF RESIDUES IN STORAGE AND PROCESSING

In processing

Oranges. 453-544 kg of Navel oranges from two plots in Dinuba, California, treated with three WP applications of phosmet at 17 kg ai/ha (66 trees/plot, A-5326) or 17 kg ai/ha plus summer oil (61 trees/plot, A-5328) harvested 7 days after the last spray were sent for commercial processing (McAfee, 1972). The process is shown in Figure 1.

Figure 1. Commercial processing of oranges.

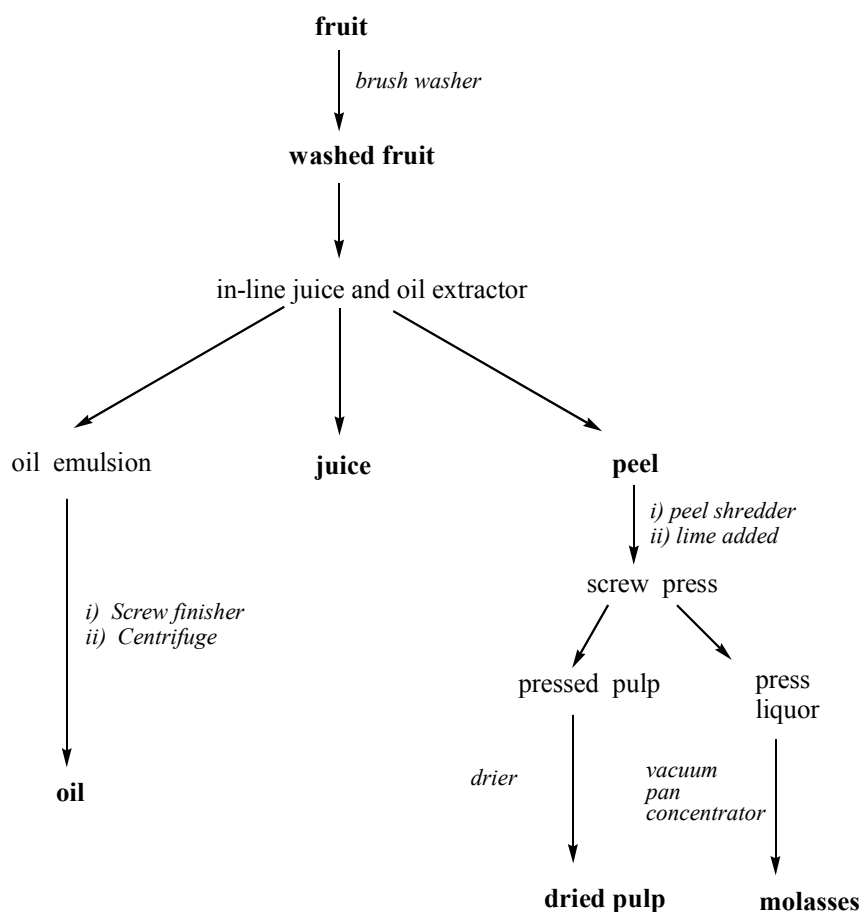


Table 14. Phosmet residues in oranges and processed fractions, with processing factors (McAfee, 1972).

Sample	3×17 kg ai/ha + summer oil (A5328)			3×17 kg ai/ha (A5226)		
	Phosmet	Oxon	PF (phosmet)	Phosmet	Oxon	PF (phosmet)
Fruit	1.2, 0.85, 0.89	0.22, 0.22, 0.13		1.3, 1.1, 1.0	<0.05 (3)	-
Washed fruit	0.23, 0.21, 0.23	0.18, 0.14, 0.09	0.23	0.13, 0.10, 0.12	<0.05 (3)	0.10
Peel	0.25, 0.23, 0.27	0.05 (3)	0.26	0.16, 0.15, 0.11	<0.05 (3)	0.12
Dry pulp	<0.05 (2)	<0.05 (2)	<0.05	<0.05 (2)	<0.05 (2)	<0.04
Press liquor	<0.05 (2)	<0.05 (2)	<0.05	<0.05 (2)	<0.05 (2)	<0.04
Molasses	<0.05 (2)	<0.05 (2)	<0.05	<0.05 (2)	<0.05 (2)	<0.04
Juice	<0.05 (3)	<0.05 (3)	<0.05	<0.05 (3)	<0.05 (3)	<0.04
Oil	2.9, 5.4	0.07, 0.07	4.3	2.4, 2.5	<0.05, 0.05	2.2

Residues are for replicate collected samples

The mean processing factors were 0.17 for washed fruit, 0.19 for peel, <0.05 for dry pulp, <0.05 for molasses, <0.05 for juice and 3.3 for oil.

NATIONAL MAXIMUM RESIDUE LIMITS

The definition of the residue for phosmet in Australia is the sum of phosmet and its oxygen analogue, expressed as phosmet.

The Meeting was informed that the following national MRLs were established:

Country	Commodity	MRL (mg/kg)
Australia	Cattle, edible offal, cattle fat, cattle meat, milk, stone fruit	1
	Cereal grains, goat edible offal, goat meat, pig edible offal, pig meat, sheep edible offal, sheep meat	0.1
Austria	Kiwifruit, pome fruit	1
	Peas, potatoes, sugar beets	0.1
	Rape seed	0.5
Belgium	Citrus fruit	5
	Kiwifruit	10
	Pome fruit	1
	Potatoes	0.1
Brazil	Apples, peaches, pears, quince	1
	Citrus fruit	5
	Cotton seed	0.1
Canada	Apples, grapes, peaches, pears	10
	Blueberries, plums	5
	Cherries	7
	Kiwifruit	1
China	Tea	0.5
Czech Republic	Alfalfa	40
	Apples, grapes, maize silage, whortleberries	10
	Apricots, citrus fruit, nectarines	5
	Cattle fat	1
	Maize, sweet corn, nuts, potatoes	0.1
	Milk, peas	0
EEC	Tea	0.1
Finland	Citrus fruit	5
	Kiwifruit	10
France	Kiwifruit	10
	Pome fruit	2
Germany	Kiwifruit	15
	Pome fruit	2
	Rape seed	0.5
	Potato, sugar beet	0.1
Hungary	All food crops	2
Iceland	Kiwifruit	5
	Pome fruit	0.2
	Tea	0.1
Israel	Cattle fat	1
	Milk	0
Italy	Apples, apricots, cherries, citrus fruit, olives, peaches, plums	0.6
	Potatoes	0.1
Japan	Pulses, rice	0.1
	Summer orange, exocarp	2
	Tea	0.5
	Vegetables	0.1
Kenya	Alfalfa	40
	Apples, blueberries, grapes, maize forage/fodder, peaches, pears, pea hay/fodder, sweet potatoes	10
	Apricots, citrus fruits, nectarines	5
	Cattle meat	1
	Feijoa	2

Country	Commodity	MRL (mg/kg)
	Kiwifruit	15
	Maize, sweet corn, nuts, potatoes, tea	0.1
	Milk	0
	Peas	0.2
Korea	Cattle meat	1
Malaysia	Apples, apricots, cherries, nectarines, peaches, pears, plums	1
	Peas, rice	0.1
	Maize, sweet corn	0.2
	Kiwifruit	1.5
Netherlands	Bilberry, sweet potatoes	10
	Cattle meat, milk, nuts, potatoes	0.1
	Citrus fruit	5
	Kiwifruit	15
	Peas	0.2
New Zealand	Kiwifruit	15
Singapore	Apples, berry fruit, grapes, peaches, pears, sweet potatoes	10
	Cattle fat	1
	Citrus fruit, forage crops, dry, nectarines	5
	Kiwifruit	15
	Maize, sweet corn	0.2
	Milk	0
	Peas, pig meat, potatoes	0.1
Slovak Republic	Bilberry, sweet potatoes	10
	Cattle meat	1
	Citrus fruit	5
	Kiwifruit	15
	Maize, sweet corn, nuts, peas, potatoes	0.1
Spain	Berry fruits, nuts, small fruits, stone fruit	2
	Brassica vegetables, bulb vegetables, leafy vegetables, legumes, potatoes, root and tuber vegetables, sugar beets, tea	0.1
	Citrus fruits	5
	Maize, sweet corn, sorghum	0.2
Switzerland	Citrus fruit	5
	Kiwifruit	15
	Peas, potatoes	0.1
	Stone fruit	1
Taiwan	Citrus fruit, root and tuber vegetables	0.5
	Fruiting vegetables, leafy vegetables, melons, peas, rice	1
Yugoslavia	Fruits, grapes	0.5
	Potatoes	0.1

APPRAISAL

Phosmet (*O,O*-dimethyl *S*-phthalimidomethyl phosphorodithioate) was evaluated under the periodic review in 1994 for toxicology and in 1997 for residues. The 1997 JMPR agreed to withdraw previous recommendations for blueberries, citrus fruits, nectarines, pears and tree nuts, among others. The 31st CCPR (1999) decided to retain the CXLs under the periodic review procedure.

The Meeting received information on phosmet national registered use patterns, supervised residue trials and fate of residues in processing and national MRLs.
Supervised trials

Supervised trials were available for the use of phosmet on many crops: citrus (oranges, mandarins, lemons, grapefruit), pears, nectarines, blueberries and tree nuts (almonds, hazelnuts, walnuts, pistachios and pecans).

Citrus. Phosmet is registered in the USA for use on oranges and grapefruit in Florida at 0.8-1.6 kg ai/ha with a PHI of 7 days. None of the USA trials matched GAP.

GAP was reported by the 1997 JMPR for the use of phosmet on citrus in Argentina. Application is at a spray concentration of 0.06 kg ai/hl with no harvest interval specified. None of the Argentina trials matched GAP in Argentina.

Phosmet is registered in the Spain for use on citrus fruits at 0.075-0.125 kg ai/hl with a PHI of 30 days. The residues resulting from Spain trials meeting those conditions were: mandarins/tangerines 0.09, 0.47, 0.61, 0.67, 0.90, 1.0, 1.4, 1.5 and 1.6 mg/kg; oranges 0.05, 0.10, 0.32, 0.36, 0.57, 0.73 and 1.8 mg/kg. Residues from the two fruits appear to be from the same population and may be evaluated together. Phosmet residues in citrus from 16 trials matching GAP in the Spain in rank order (median underlined) were: 0.05, 0.09, 0.10, 0.32, 0.36, 0.47, 0.57, 0.61, 0.67, 0.73, 0.90, 1.0, 1.4, 1.5, 1.6 and 1.8 mg/kg.

The Meeting estimated a maximum residue level and STMR value for phosmet in citrus fruits of 3 and 0.64 (whole fruit) mg/kg, respectively. The estimated maximum residue level of 3 mg/kg for citrus fruits replaces the previous recommendation for withdrawal.

Four orange and four mandarin samples from the trials were peeled and residues were measured in the peeled fruit. Residues in the peeled oranges (pulp) were 0.09, 0.15 and 0.52 mg/kg (whole oranges 0.41, 0.57, 0.73 and 1.8 mg/kg). In peeled mandarins the residues of phosmet were 0.12, 0.21, 0.30, 0.33 mg/kg (whole mandarins 0.90, 1.4, 1.4 and 1.6 mg/kg). As residues from the two fruits appear to be from the same population they may be evaluated together. The residues in peeled oranges and mandarins were (median underlined) 0.09, 0.12, 0.15, 0.21, 0.30, 0.33 and 0.52 mg/kg.

The Meeting estimated STMR and HR values for phosmet in citrus edible portion of 0.21 and 0.52 mg/kg, respectively.

Pears. The trials from Chile (0.75-0.9 kg ai/hl, PHI 7 days) and the UK (no GAP) did not match GAP and trials from these countries were not evaluated further. The Canadian trials did not match the GAP of that country and were evaluated against GAP in the USA. One of the Canada trials matched GAP in the USA, however the residue in the untreated control (0.22 mg/kg) was more than 10% of the treated sample (0.84 mg/kg). This trial was not used to estimate a maximum residue level.

In the US phosmet is registered for use on pears at 1.7-5.6 kg ai/ha or at a spray concentration of 0.025-0.05 kg ai/hl and with a PHI of 7 days. Residues of phosmet in pears in rank order (median underlined) were: 1.3, 1.7 and 1.8 mg/kg in pears for 3 trials in the USA matching US GAP.

The 1997 estimated a maximum residue level for apples based on GAP in the USA (1.7-4.1 kg ai/ha; PHI 7 days). The residues in apples approximating GAP, in rank order, were: 1.8, 1.8, 2.8, 3.3, 3.4, 3.4, 3.7, 4.2, 4.3 and 7.3 mg/kg. The current Meeting considered that the residues in apples and pears could be combined for the purposes of estimating a maximum residue level and decided to pool the data to estimate a pome fruit maximum residue level, residues in rank order (median underlined): 1.3, 1.7, 1.8 (3), 2.8, 3.3, 3.4, 3.4, 3.7, 4.2, 4.3 and 7.3 mg/kg.

The Meeting estimated a maximum residue level, an STMR and an HR value for phosmet in pome fruits of 10, 3.3 and 7.3 mg/kg, respectively. The estimated maximum residue level of 10 mg/kg for pome fruits replaces the previous recommendation for apples of 10 mg/kg.

Nectarines. Data on nectarines from Chile did not approximate GAP for that country (spray concentration 0.05-0.06 kg ai/ha; PHI 14 days) and were not further evaluated.

US GAP permits phosmet application on nectarines at 1.7-3.3 kg ai/ha with harvest 14 days after the final application. A single trial in the USA was conducted according to GAP and had a residue of 0.55 mg/kg in whole fruit. The number of trials is insufficient to estimate an MRL, STMR or HR for phosmet on nectarines.

The Meeting noted that the GAP reported for peaches in the evaluation by the 1997 JMPR was the same as for nectarines and agreed that the residue trials reported for peaches and apricots by the 1997 JMPR could be used to support a recommendation for a maximum residue level for nectarines. The residues of phosmet in trials on peaches, nectarines and apricots according to GAP were (median underlined): 0.45, 0.55, 0.87, 1.2, 1.5, 1.6, 2.9, 4.2, 4.7, 6.4 and 6.8 mg/kg. The Meeting recommended a maximum residue level, an STMR and an HR value for phosmet in nectarines of 10, 1.6 and 6.8 mg/kg, respectively, the same as for peaches. The estimated maximum residue level of 10 mg/kg for nectarines replaces the previous recommendation for withdrawal.

Blueberries. US GAP permits application of phosmet to blueberries at a 1 kg ai/ha and harvest 3 days after the final application. In 9 trials in the USA in matching the application rate and with PHIs of 3-4 days, phosmet residues in rank order (median underlined, residues from replicate analyses averaged) were: 1.0, 2.4, 3.4, 3.7, 4.0, 4.0, 5.8, 6.6 and 9.9 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for phosmet in blueberries of 15, 4.0 and 9.9 mg/kg, respectively. The estimated maximum residue level of 15 mg/kg for blueberries replaces the previous recommendation for withdrawal.

Tree nuts. The commodity to which the MRL applies in the case of tree nuts is the nutmeat. For phosmet the residue is essentially located in the hulls and shell. The meeting was of the opinion that residues in the nut arise as a result of contamination during processing to extract the nutmeat. In this case, the interval between the last spray and harvest is not as important as for other crops and the Meeting decided to only consider the application rate in deciding whether or not trials matched GAP.

Phosmet is registered in the USA for use on almonds at 3.4-4.2 kg ai/ha with harvest permitted 30 days after the final application. In one of the trials that matched GAP, significant residues were reported in the untreated control sample of hulls though residues in the control nutmeat samples were all <LOQ for the same trial. The Meeting considered that as residues in nutmeat were below the LOQ for this trial that they could be used to estimate a maximum residue level. Phosmet residues in almond nutmeat from 4 trials that approximated GAP (median underlined) were: <0.05 (2), 0.05 and 0.07 mg/kg at 21-40 days after application at 3.4-4.5 kg ai/ha.

None of the US trials of hazelnuts matched US GAP.

Phosmet is registered in the USA for use on pecans at 1.6-2.45 kg ai/ha or at a spray concentration of 0.05 kg ai/hl with harvest permitted 14 days after the final application. Phosmet residues in pecan nutmeat were <0.05 (2), and 0.09 mg/kg at 14-15 days after application at 1.6-2.0 kg ai/ha.

Phosmet is registered in the USA for use on pistachios at 3.4-4.4 kg ai/ha with harvest permitted 14 days after the final application. Phosmet residues in pistachio nutmeat were <0.05 (4) mg/kg at 14-15 days after application at 4.5 kg ai/ha.

Phosmet is registered in the USA for use on walnuts at 3.4-6.7 kg ai/ha with harvest permitted 14 days after the final application. Phosmet residues in walnut nutmeat were <0.05 mg/kg in a single trial that matched USA GAP.

The Meeting agreed that the residues found in nutmeat from the various tree nuts were consistent and that a group MRL could be estimated by combining the available data. Phosmet residues in tree nuts (median underlined) were <0.05 (7), 0.05, 0.06, 0.07 and 0.09 mg/kg.

The Meeting estimated a maximum residue level, an STMR value and an HR value for phosmet in tree nuts of 0.2, 0.05 and 0.09 mg/kg, respectively noting the possibility for contamination during processing. The estimated maximum residue level of 0.2 mg/kg for tree nuts replaces the previous recommendations for withdrawal.

Processing

The meeting received information on the fate of incurred residues of phosmet residues during the processing of oranges. Processing factors were calculated for processed commodities derived from these raw agricultural commodities. When residues in the processed commodity did not exceed the LOQ the processing factor was calculated from the LOQ and was prefixed with a 'less than' symbol (<).

The phosmet processing factors for oranges to juice and dried pulp were <0.05 and <0.05 respectively. These factors applied to the STMR (0.64 mg/kg) and MRL (3 mg/kg) for citrus whole fruit provide the STMR-P for orange juice (0.03 mg/kg) and STMR-P for dried processed citrus pulp (0.03 mg/kg).

FURTHER WORK OR INFORMATION

Desirable

RECOMMENDATIONS

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

Definition of the residue (for compliance with MRLs and for estimation of dietary intake): phosmet.

Commodity		MRL	mg/kg	STMR or STMR-P	HR or HR-P
CCN	Name	New	Previous		
FP 0226	Apple	W	10		
FB 0020	Blueberries	15	W	4.0	9.9
FC 0001	Citrus fruits	3	W	0.21	0.52
JF 0004	Orange juice			0.03	-
FS 0245	Nectarine	10	W	1.6	6.8
FP 0009	Pome fruits	10		3.3	7.3
TN 0085	Tree nuts	0.2	W	0.05	0.09

DIETARY RISK ASSESSMENT

Chronic intake

The evaluation of phosmet has resulted in recommendations for MRLs and STMRs for raw and processed commodities. Consumption data were available for 12 food commodities and were used in the dietary intake calculation. The results are shown in Annex 3.

The International Estimated Daily Intakes for the 5 GEMS/Food regional diets, based on estimated STMRs were in the range 0-40% of the ADI of 0-0.01 mg/kg bw (Annex 3). The Meeting concluded that the long-term intake of residues of phosmet from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The international estimated short-term intake (IESTI) for phosmet was calculated for the food commodities (and their processing fractions) for which maximum residue levels and HRs were estimated and for which consumption data were available. Where group MRLs were estimated (e.g. for citrus fruits) the IESTI was calculated for the specific commodities with data supporting that group MRL (e.g. grapefruit, lemon and orange supporting citrus). The results are shown in Annex 4.

The IESTI varied from 0-1200 % of the acute RfD (0.02 mg/kg bw) for the general population. The IESTI varied from 0-3500% of the acute RfD for children 6 years and below. The estimated short-term intakes that exceeded the acute RfD were apple (1200%), blueberry (120%), nectarine (780%) and pear (900%) for the general population and apple (3500%), blueberry (390%), citrus fruit (grapefruit, 150%, oranges 170%), nectarine (2200%) and pear (3000%) for children 6 years and below. The information provided to the Meeting precluded a conclusion that the acute dietary intake of the above commodities would be below the acute RfD.

The Meeting noted that the existing acute RfD is conservative because it is based on a developmental end-point, which is not appropriate for children. Therefore, the acute RfD for children, and possibly for the general population including women of child bearing age, might be refined if an appropriate single-dose study would be available.

The Meeting concluded that the short-term intake of residues of phosmet from use on tree nuts is unlikely to present a public health concern.

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