FOLPET

EXPLANATION

Folpet was first evaluated in 1969 and has been reviewed several times since, most recently in 1993 and 1994 for residues.

The 1990 JMPR required, by 1992, results of supervised trials on apples, cherries, cucumbers, grapes, bulb onions, strawberries and tomatoes, as well as current information on GAP relevant to those crops and to the supervised trials. At the 23rd (1991) Session of the CCPR it was decided (ALINORM 91/24A, para 95) to propose withdrawal of the CXLs for blueberries, currants, raspberries and watermelon and to maintain the CXLs for all the other commodities, regarding them as temporary until 1992.

The 24th (1992) Session of the CCPR was informed that residue studies on citrus fruits, lettuce, melons and potatoes were in progress and that data would be available for the 1994 JMPR. The CCPR decided to maintain CXLs as temporary for all commodities. The 25th Session was informed that the manufacturer had provided information for all commodities with temporary MRLs except cherries and onions (ALINORM 93/24A, para 66).

The 1995 CCPR decided to delete the CXLs for apple, cherries, citrus fruits, head lettuce, melons except watermelon, bulb onion and tomato (ALINORM 95/24A, para 94).

The 28th (1996) Session of the CCPR was informed that data on cucumbers and strawberries as well as on those commodities whose CXLs were deleted in 1995 would be ready for evaluation by the 1997 JMPR, and decided to keep the MRL for cucumbers at Step 3 and to advance the MRL for strawberry to Step 7B (ALINORM 97/24, para 42). The manufacturer confirmed the availability of data on apples, cucumbers, lettuce, melons, onions, strawberries and tomatoes.

The basic manufacturer provided information to the Meeting on metabolism, analytical methods, freezer storage stability, registered uses, data from supervised trials on fruit and vegetable crops, and processing studies. Information on GAP and summary reports of supervised trials were provided by Germany.

METABOLISM AND ENVIRONMENTAL FATE

Plant metabolism

The Meeting received information on the metabolism of folpet in tomato plants, winter wheat, grapes and avocados.

Cheng (1980) treated the roots of tomato plants (7 weeks old) with 4 mg/l [*carbonyl*-^{14}C]folpet in a nutrient solution containing 0.25% acetone, and harvested the plants for analysis 1, 4, 7 and 11 days after treatment. Each plant received 25 ml of the treatment solution while under a growth lamp.

Methanol/water extracts of the tomato roots and tops were examined by TLC for ^{14}C compounds. One day after treatment about 85% of the ^{14}C in the nutrient solution was absorbed into the plants and about 60% of the absorbed ^{14}C was translocated to the tops. By the eleventh day 93% of the ^{14}C had been absorbed from the nutrient solution and of this 90% was in the tops. Folpet itself was a very minor constituent of the residue in the plant.

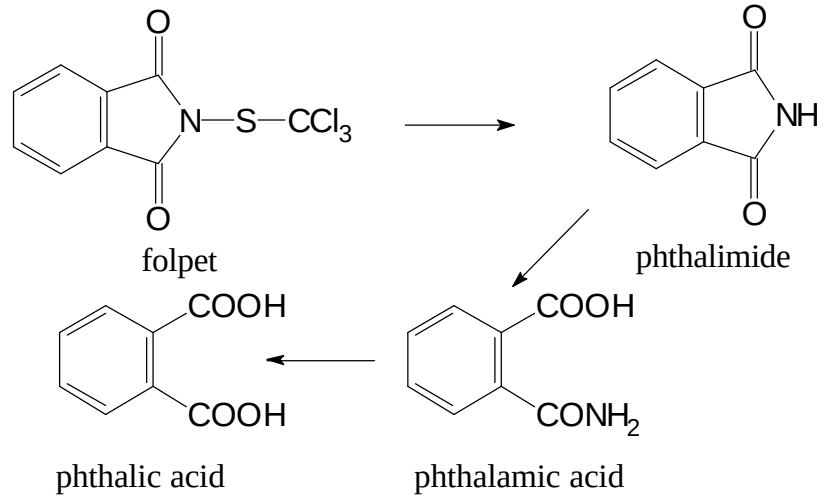
Table 1. Metabolites in tomato plants exposed through the roots to a nutrient solution containing [carbonyl-14C]folpet (Cheng, 1980).

Compound	Compound as % of extractable ^{14}C in roots or tops							
	Day 1		Day 4		Day 7		Day 11	
	Top	Root	Top	Root	Top	Root	Top	Root
Folpet	<0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Phthalimide	5.9	1.7	5.4	2.1	2.9	1.9	3.4	1.4
Phthalic acid + phthalamic acid	76	93	67	93	68	93	63	91
Unidentified[1]	15	2.3	25	2.8	26	3.0	30	5.1

[1]Three polar metabolites, possibly ring-hydroxylated phthalamic acid derivatives.

The Rf values of phthalic acid and phthalamic acid were too close for the compounds to be separated by TLC for quantitative measurement, but about 90% of the ^{14}C was estimated to be phthalamic acid from an autoradiogram.

Figure 1. Folpet metabolism in tomato plants.



Crowe (1995) applied [*benzene*-^{14}C]folpet to winter wheat plants twice at a rate equivalent to 1.6 kg ai/ha and sampled the plants 1 day after each application, at maturity, and at harvest, when the ages of the plants were 190, 214, 258 and 269 days respectively.

The levels of ^{14}C were lower in the roots than the straw or grain at each sampling. The plant parts were not washed before measurements were made, so surface residues are included. The recovery of the ^{14}C in the extracts and unextracted residues was high, particularly for straw and grain. Levels of ^{14}C were higher in the harvested crop because the plants had begun to dry out. The composition of the extractable residue is shown in Table 2.

Day	Total ^{14}C as folpet, mg/kg.		
	roots	straw	grain
191	0.03	4.5	3.2
215	0.23	9.4	7.5
258	0.63	13	10
269	0.74	15	24

Treatment of the extracted straw from day 269 with 1M HCl to release bound residues released phthalic acid (1 mg/kg).

Table 2**.** Composition of the extractable residue in winter wheat straw and grain from plants treated with [*benzene*-^{14}C]folpet at 1.6 kg ai/ha on days 190 and 214 (Crowe, 1995).

Compound	^{14}C as parent or metabolite, mg/kg							
	Day 191		Day 215		Day 258		Day 269	
	Straw	Grain	Straw	Grain	Straw	Grain	Straw	Grain
Folpet	3.5	1.8	4.7	4.8	6.9	4.7	4.7	9.3
Phthalic acid	NDR	NDR	NDR	NDR	0.60	0.57	4.3	6.4
Phthalimide	0.41	0.80	0.98	1.2	0.76	0.98	1.5	3.1
Polar metab					0.43	0.49		
Unknown						0.29		

NDR: no detectable residues

Folpet itself was the major component of the residue in all cases, but in the final stage the levels of phthalic acid + phthalimide exceeded those of folpet. Phthalamic acid was not mentioned in this study.

Mester (1994a) made 3 foliar applications of [*benzene*-^{14}C]folpet at 1-month intervals to Thomson Seedless grape vines, equivalent to 1.5 kg ai/ha at each application, and harvested grapes and leaves 25 days after the final application for analysis and identification of metabolites by O'Connor (1994). Less than 1% of the ^{14}C in the grapes or leaves remained after washing and water/acetonitrile extraction. The water/acetonitrile extract was further divided into dichloromethane- and water-soluble fractions. The disposition of the radiolabel is shown in Table 3.

Table 3. Distribution of radiolabel in rinses and extracts from grapes and leaves of vines treated with 3×1.5 kg ai/ha [*benzene*-^{14}C]folpet and harvested 25 days after the final application (O'Connor, 1994).

Fraction	Grapes		Leaves	
	^{14}C as % of total	^{14}C as folpet, mg/kg	^{14}C as % of total	^{14}C as folpet, mg/kg
Rinse	26	2.0	87.8	258
Organosoluble	19	1.4	6.5	19
Water-soluble	54	4.1	4.6	14
Unextracted	1.5	0.11	1.1	3.2
TOTAL	100.5	7.6	100.0	294

The identities of the components in the rinses and extracts are shown in Table 4. Folpet, phthalic acid and phthalimide constituted 27%, 5.8% and 11% respectively of the residue on the grapes. An unidentified compound in the water-soluble fraction accounted for 41% of the residue. HPLC showed that it was very polar; it was eluted with the solvent front on a reversed phase system. Attempts to identify the material by MS and various combinations of HPLC-MS were not successful. Since acid hydrolysis yielded phthalic acid the material was identified as phthalic acid conjugate(s). Phthalamic acid was not considered as a possible metabolite.

Table 4. Components of the residue on grapes and leaves of vines treated with 3 × 1.5 kg ai/ha [*benzene*-^{14}C]folpet and harvested 25 days after the final application (O'Connor, 1994).

Compound	Residue in grapes expressed as folpet, mg/kg			Residue in leaves expressed as folpet, mg/kg		
	Rinse	Organosoluble	Water-soluble	Rinse	Organosoluble	Water-soluble
Folpet	1.1	0.97		251	15	
Phthalic acid	0.16	0.28			2.2	4.8
Phthalimide	0.74	0.07		7.2	1.6	
Unidentified 1		0.11				
Unidentified 2			3.1			
Unidentified 3						6.7
Unidentified 4						2.0

Mester (1994b) sprayed a small avocado tree in California three times at 21-day intervals with [*benzene*-^{14}C]folpet at the equivalent of 3.4 kg ai/ha for each application, and harvested fruit and leaves 21 and 97 days after the final application for analysis and identification of metabolites by Toia and Collins (1994). The fruit harvested at 97 days were mature.

After aqueous rinsing to release surface residues the samples were thoroughly extracted with ethyl acetate. The distribution of radiolabel in the fruit and leaves is shown in Table 5. The components in the rinses and extracts were identified by TLC and HPLC with the results shown in Table 6.

Table 5. Distribution of radiolabel in rinses and extracts of avocado fruit and leaves from a tree treated with 3×3.4 kg ai/ha [*benzene*-^{14}C]folpet and harvested 21 and 97 days after the final application (Toia and Collins, 1994).

Fraction	^{14}C as folpet, mg/kg			
	Fruit		Leaves	
	21 days	97 days	21 days	97 days
Rinse	0.70	0.014	48	21
Ethyl acetate extract	8.8	14 (peel) 7.5 (pulp)	68	37
Residue after ethyl acetate extract	1.4	3.2 (peel) 0.66 (pulp)	20	15

Table 6. Components of the residue on avocado fruit and leaves from a tree treated with 3×3.4 kg ai/ha [*benzene*-^{14}C]folpet and harvested 21 and 97 days after the final application (Toia and Collins, 1994).

Compound	^{14}C expressed as folpet, mg/kg				
	Fruit			Leaves	
	21 days		97 days	21 days	
	rinse	extract	extract	rinse	extract
Folpet	0.29	0.25	0.026	24	54
Phthalimide	0.20	0.55	0.22	10.4	1.2
Phthalic acid	0.077	7.2	4.5	4.0	11
Polar materials	0.018	0.52	0.40	0.94	8.6
Others		0.59	0.34		0.78

Phthalic acid was the main component of the residue in the extracts of the fruit. Extracts of the peel and pulp from mature avocado fruit (97-day) were examined separately; phthalic acid constituted 85% and 67% of the residues in the pulp and peel respectively (all expressed as folpet).

	Residue expressed as folpet, mg/kg on a whole fruit basis	
	Peel extracts	Pulp extracts
Folpet	0.022	0.004
Phthalimide	0.15	0.067
Phthalic acid	0.65	3.8
Polar compounds	0.017	0.38
Others	0.13	0.21

Folpet itself was mostly a surface residue. In the avocados harvested 21 days after the final application it accounted for 47% of the ^{14}C in the rinse, but only 2.7% of that extracted from the fruit. In the fruit harvested 97 days after the final application the residue in the rinses was too low to identify individual components, but in the extracts folpet accounted for only 0.5% of the ^{14}C.

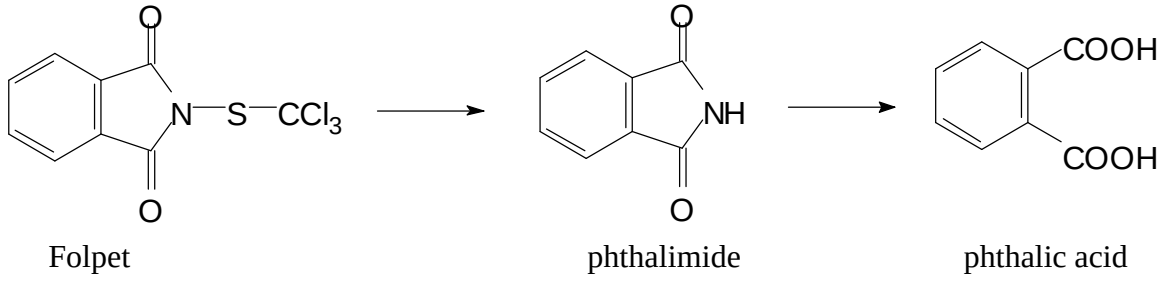


Figure 2. Folpet metabolism in wheat, grapes and avocados.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The analytical method of Schlesinger (1991) for folpet and phthalimide residues in non-oily crops was reviewed by the 1993 JMPR. Cowlyn (1996) described in detail the methods, developed from the Schlesinger method, used in the supervised trials to analyse apples, lettuce, melons, onions, strawberries and tomatoes, and summarized the validation data. Folpet in the cleaned-up extracts was determined by GLC with an ECD.

The region corresponding to the retention time of folpet in the chromatograms from control extracts was examined for potential interfering peaks. Freedom from peaks in the control was taken to indicate specificity.

Recovery range	Number of values
50-59%	2
60-69%	13
70-79%	88
80-89%	98
90-99%	79
100-109%	45
110-119%	12
120-129%	3

Recoveries of folpet by methods based on that of Schlesinger (1991) were determined during method validation and in supervised trials on apples, apple juice, wet apple pomace, cranberries, cucumbers, grape juice, grapes, lettuce, melons, must, onions, raisins, spirits, strawberries, tomatoes, tomato paste, tomato purée and wine, at levels from 0.05 mg/kg to 5 mg/kg for most commodities, and up to 20 or 50 mg/kg for some. The results were satisfactory down to a level of 0.05 mg/kg, which is the limit of determination (LOD). Recoveries did not appear to depend on the residue level or the type of sample. The 340 determinations showed mean and median recoveries of 87% and 86% respectively.

De Paoli and Bruno (1995a, method MR 52) extracted tomatoes with dichloromethane, cleaned up the extract by passage through a chromatographic cartridge, and determined folpet residues in the extract by GLC with an ECD after the addition of ethion as an internal standard. Recoveries from triplicate samples were 94-110% at 0.05 mg/kg and 97-106% at 0.20 mg/kg. The LOD was 0.05 mg/kg. The same authors (1995b) used method MR 52 to analyse strawberries. Triplicate recoveries were 72-80% at 0.10 mg/kg and 94-101% at 0.50 mg/kg.

Grinbaum (1994) analysed grape samples for folpet and phthalimide residues after extracting the grapes with acetone and cleaning up the extract by solvent partition and column chromatography (method FO 05/89). Folpet was measured with an ECD and phthalimide with a nitrogen-specific thermionic detector. Quantitative recoveries of both analytes were obtained at levels of 0.1 mg/kg and above. The mean recovery of folpet in 13 tests at fortification levels of 0.10 to 3.0 mg/kg was 91% (range 75-114%) and that of phthalimide in 9 tests at levels of 0.07 to 1.0 mg/kg was 90% (range 76-105%).

Williams (1996) tested the Schlesinger method (FP/15/91) and a method for the determination of folpet residues in oily crops (Nishioka *et al.*, 1996) to determine whether they could be successfully and reproducibly used by competent chemists without outside assistance in a laboratory without prior experience with the methods.

Williams suggested minor modifications which improved reproducibility. Dilutions of stock solutions for GLC were prepared in hexane containing 2% di(ethyleneglycol)diethyl ether, which reduced the degradation of folpet during gas chromatography; degradation had varied between runs and with different crop extracts. Additional clean-up was needed to produce clean extracts from onions. Recoveries and repeatability were satisfactory with the modified Schlesinger method for folpet in apples, cantaloupes, cranberries, cucumbers, grapes, lettuce, onions, strawberries and tomatoes. Folpet residues in avocados were successfully determined by the Nishioka method with some additional clean-up.

Stability of pesticide residues in stored analytical samples

Information was made available to the Meeting on the stability of folpet in apple juice, wet apple pomace, apples, cranberries, cucumbers, grape juice, lettuce, onions, tomato paste, tomato purée and tomatoes during frozen storage. The data are shown in Table 7.

Table 7. Freezer storage stability of folpet in various substrates fortified with folpet at 1 mg/kg. Raw agricultural commodities were stored whole. The percentage of folpet remaining was calculated from the analytical results at day 0 and after the storage interval, both of which were uncorrected for batch analytical recoveries.

Commodity	Storage temp	Folpet spike, mg/kg	% folpet remaining	Reference
Apple juice	-12 to -27°C	1.0	106 77 77	95-0059
Wet apple pomace	-12 to -27°C	1.0	99 90	95-0059
Apples, whole	-12 to -27°C	1.0	105 98 111	95-0059
Cranberries	-12 to -27°C	1.0	81 90 109 83	AA950306
Cucumbers	below -10°C	1.0	78 98	95-0065
Grape juice	below -12°C	1.0	111 116 108 105	95-0100
Lettuce	-10 to -27°C	1.0	101 96 100	95-0066
Onions	-12 to -27°C	1.0	106 93	95-0070
Tomato paste	below -10°C	1.0	89 99	95-0060
Tomato purée	below -10°C	1.0	91 89	95-0060
Tomatoes, whole	below -10°C	1.0	92 93 91 80	95-0060

Triplicate samples of raisins (hydrated) from processing trials (95-0100) on grapes were analysed for folpet residues before and after storage in a freezer below -12°C for 21 days. The residues had decreased by an average of 6%.

Folpet residues were stable in the various substrates during freezer storage for the periods tested, but in some cases the periods did not exceed 30 days.

Definition of the residue

The Meeting agreed that the current definition is suitable for assessing compliance with MRLs and for the estimation of dietary intake.

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

USE PATTERN

Table 8. Registered uses of folpet. All foliar applications.

Crop	Country	Form	Application			PHI, days
			Rate, kg ai/ha	Spray conc. kg ai/hl	No.	
Apples	Argentina	WP	3.6	0.12	3	10
Apples	Canada	WP	0.8	0.10	8	7
Apples	Chile	WP	2.0	0.11	3	7
Apples	France (north)	SC	1.04	0.104-0.14	11	14
Apples	France (south)	SC	0.98-1.2	0.081-0.12	9	14
Apples	Hungary	WP	1.6	0.104	8	10
Apples	Portugal	WP	1.6	0.13	8	21
Apples	Spain	WP	1.9	0.16	6	10
Apples	Switzerland	WG	2.0	0.10	4	21
Cucumbers	Canada	WP	1.0	0.10	8	7
Cucumbers	Mexico	WP	1.8	0.29-0.88	4	3
Grapes	Argentina	WP	1.02	0.10-0.13	4	7
Grapes	Chile	WP	2.0	0.15	3	14
Grapes, wine	Germany	SC	0.45-1.2	0.075	8	Up to stage 61 and 68-81
Grapes, wine	Germany	SC	0.6-1.6	0.1	6	Up to stage 81
Grapes	Italy	WP	1.6	0.16	5	10/40
Grapes	Mexico	WP	1	0.10-0.25	7	10
Lettuce	Greece	SC	0.61	0.12	4	20
Lettuce	Mexico	WP	1.3	0.25-0.63	4	7
Lettuce	Portugal	WP	0.52	0.13	3	14
Lettuce	Spain	WP	0.78	0.16	4	21
Melons	Greece	SC	0.49	0.061	4	20
Melons	Guatemala	WP	0.48	0.096-0.24	6	3
Melons	Honduras	WP	0.64	0.13-0.21	4	3
Melons	Mexico	WP	1.8	0.35-0.88	6	7
Onions	Chile	WP	2.0	0.13	3	7
Onions	Greece	SC	0.61	0.12	3	20
Onions	Hungary	WP	0.39-0.67	0.078-0.43	3	14
Onions	Mexico	WP	1.5	0.30-0.75	4	7
Onions	Portugal	WP	0.52	0.13	3	7
Onions	Spain	WP	0.623	0.16	3	10
Strawberries	Netherlands	WG	1.36	0.14	2	14
Strawberries	Netherlands	WP	1.34	0.13	2	14
Strawberries	Mexico	WP	1.3	0.25-0.63	4	2
Tomatoes	Chile	WP	1.7	0.15	7	7
Tomatoes	Hungary	WP	0.65	0.13	3	14
Tomatoes	Mexico	WP	2.0	0.40-1.0	5	2
Tomatoes	Portugal	WP	1.3	0.16	4	7
Tomatoes	Spain	WP	1.6	0.097-0.26	6	10

RESIDUES RESULTING FROM SUPERVISED TRIALS

Supervised residue trials on fruit and vegetables are summarized in Tables 9-15.

Table 9	Apples. Argentina, Canada, Chile, France, Germany, Hungary, Portugal, Spain, Switzerland, USA.
Table 10	Grapes. Argentina, Chile, France, Germany, Italy, Mexico.
Table 11	Strawberries. Italy, Mexico, Netherlands.
Table 12	Onions. Chile, Greece, Hungary, Mexico, Portugal, Spain.
Table 13	Cucumbers. Canada, Mexico. Melons. Greece, Guatemala, Honduras, Mexico.
Table 14	Tomatoes. Chile, Hungary, Italy, Mexico, Portugal, Spain, USA.
Table 15	Head lettuce. Greece, Hungary, Mexico, Portugal. Leaf lettuce Greece, Mexico, Spain. Lamb's lettuce. Germany

Where residues were not detected, they are recorded in the Tables as less than the limit of determination (LOD), e.g. <0.05 mg/kg. Residues, application rates and spray concentrations have generally been rounded to 2 significant figures or, for residues near the LOD, to 1 significant figure. Although all trials included control plots, no control data are recorded in the Tables except where residues in control samples exceeded the LOD. Residues are not corrected for recoveries except in a strawberry trial and a tomato trial where only corrected results were reported.

All trials except German trials on apples and lamb's lettuce were fully reported as well as being summarized.

Folpet was applied to apple trees in supervised trials in France, Hungary, Portugal, Spain and Switzerland by backpack airblast or lance sprayers. Plot sizes were in the range 86-240 m^2. In the label-rate trials 3 field samples were analysed from each of 2 treated plots (Table 9).

In supervised apple trials at 4 sites in Canada, 2 in Argentina and 2 in Chile folpet was applied with a motorised pump backpack sprayer or an airblast sprayer driven by a power take-off (Table 9). Plot sizes ranged from 190 to 784 m^2. Two field samples, each of 2 kg, were analysed from each plot.

In a series of trials on grapes in Argentina, Chile, Italy and Mexico folpet was applied using backpack sprayers with motorized pumps. Plot sizes ranged from 55 to 520 m^2. Duplicate field samples (2 kg) were taken from each treated plot (1 treated plot per trial). The trials were on table grapes (1 trial each in Argentina, Chile and Italy), wine grapes (1 each in Chile and Italy) and raisin grapes (Mexico). Residues in the grapes in the Mexican trial were much lower than in the others. The maximum daily temperature in the final weeks of this trial was high (41°C) and this may have had an influence.

Folpet was applied by airblast knapsack sprayers 8 or 9 times at 6-15 day intervals at 1.5 kg ai/ha to grapes in 4 supervised trials in France in 1995. Plot sizes were 378-792 m^2. Duplicate 3-kg samples of grapes were harvested from each plot 0-21 days after the final application for analysis. The samples were extracted within 3 days of receipt at the laboratory and the crude extracts were stored below -18 °C. Wasser (1997) has shown that folpet residues in crude extracts of grapes were stable during refrigerator storage at 4°C for 1 month. Folpet residues in the control plot of trial EA950170 FR04 resulted from an unexpected application of folpet by the farmer approximately 2 months before harvest.

Folpet was applied by boom sprayer in the strawberry trials in Italy. Plot sizes in the two trials were 18.9 m^2 and 10 m^2. Field sample sizes were in the range 1-1.5 kg. In trial R-8989 rain (400 mm) fell between 7 and 14 days after the final application and may have reduced the residues. In trial R-8986 rain (in total about 80 mm) occurred on 9 successive days immediately after the final application. The residues from trial R-8986 were corrected for recovery, but as recoveries were in the range 84-108%, the adjustments are small.

Strawberries were produced in plastic tunnels in trials in The Netherlands. Three field samples (1 kg each) were analysed from each plot; 2 plots in each trial were treated at the label rate and 1 plot at twice that rate.

Motorised backpack sprayers were used to apply folpet to strawberries growing in 480-1200 m^2 plots in supervised trials in Mexico. Two field samples (2 kg each) were taken from each plot for analysis. Low procedural recoveries (52-53%) were experienced with strawberries from trial AA950310.01, but despite investigations no clear reason was discovered. The recorded results were not corrected for recovery.

In onion trials in Chile and Mexico folpet was applied to the foliage by backpack sprayer with a motorized pump or a CO_2 pressure source. Plot sizes were in the range 108-368 m^2. Onions (8-24 per field sample) were pulled from the ground and allowed to dry for one day in the field, then placed in a freezer after the upper foliage and roots were trimmed off. In onion trials in Greece, Hungary, Portugal and Spain folpet was applied with back boom sprayers. Plot sizes were approximately 50 m^2, with duplicate plots in each trial treated at the label rate and a single plot in each of two Hungarian trials at twice the label rate. One field sample (at least 2 kg, 12 or more onions) was analysed from each plot. The soil was removed mechanically by hand and the whole plant, including the roots and foliage, was analysed.

In cucumber trials folpet was applied with a motorized backpack sprayer in Mexico and a CO_2-pressurised backpack sprayer in Canada. Plot areas ranged from 90 to 280 m^2, each trial consisting of a treated and a control plot. The field sample size from the treated plot was 2 kg. Folpet was applied with a backpack boom sprayer to melons in trials in Greece. Plot sizes were in the range 90-180 m^2. Trials consisted of 2 plots treated at the label rate and a control plot. Duplicate field samples, each of 12 melons about 15 cm in diameter, from each trial were analysed on a “whole melon” basis.

Melons were treated with folpet applied by backpack sprayer in supervised trials in Guatemala, Honduras and Mexico. Plot sizes were in the range 120-540 m^2, with 1 treated plot and 1 control plot in each trial. Each field sample consisted of 12 melons and duplicate field samples were analysed from each plot.

The plot size was 10 m^2 in the single Italian tomato trial. Folpet was applied as a high-volume spray by knapsack. Field samples comprised 24 tomatoes. The reported residues were corrected for recovery.

Folpet was applied from a backpack boom sprayer in the tomato trials in Hungary, Spain and Portugal, except in one trial in Spain (MAK/375-07) where the spray was applied with a lance to staked tomatoes. In each trial two plots were treated at the label rate and one at a double rate. The plot size was 50 m^2. One field sample (2 kg or more) from each plot was analysed. Trials MAK/375-01 and MAK/375-03 were subject to overhead irrigation but the dates were not recorded. Residue levels could be reduced if irrigation occurred while the spray deposits were fresh.

Tomatoes at 5 sites in Mexico and 1 site in Chile were treated with folpet using backpack sprayers with motorized pumps. Plot sizes were 117-224 m^2. Two field samples (2 kg each) were analysed from the single treated plot in each trial.

Folpet was applied by backpack CO_2 boom sprayer to lettuce in two trials in Greece, one in Portugal and one in Spain. In the Greek and Spanish trials the lettuce was irrigated by overhead sprinkler either 1 or 2 days after the final application and in each of these trials the residues were below the LOD, 0.05 mg/kg. Drip irrigation was used in the trial in Portugal and the residues were substantially higher. It is likely that the sprinkler irrigation was the cause of the low residues.

A backpack boom sprayer was used to apply folpet to head lettuce grown in plastic tunnels in Hungarian trials in 1996-97. The plot size was 50 m^2. The field sample from each plot comprised 12 lettuce.

In the Mexican trials on lettuce folpet was applied with a motorized backpack sprayer. Plot areas ranged from 50 to 120 m^2. Field samples of 12 lettuce heads were cut and the outermost leaves were removed in the field. Duplicate field samples from each trial were analysed (Table 15).

Table 9. Folpet residues in apples resulting from supervised trials in Argentina, Canada, Chile, France, Germany, Hungary, Portugal, Spain, Switzerland and the USA. Residues in replicate field samples from single plots or from duplicate plots in the same trial are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country year (variety)	Application			PHI, days	Folpet, mg/kg	Ref
	kg ai/ha	kg ai/hl	no.			
Argentina, 1996 (Cooper 8)	3.6	0.12	3	10	1.1, 1.4	AA950314.07 95-0064
Argentina, 1996 (Red Delicious)	3.6	0.12	3	10	2.6	AA950314.08 95-0064
Canada, 1996 (Cortland)	0.81	0.10	8	7	0.36, 0.43	AA950314.02 95-0064
Canada, 1996 (McIntosh)	0.81	0.10	8	7	1.1, 0.61	AA950314.03 95-0064
Canada, 1996 (McIntosh)	0.81	0.10	8	7	0.65, 0.45	AA950314.04 95-0064
Canada, 1996 (Red Delicious)	0.78	0.10	8	7	1.4 1.3	AA950314.01 95-0064
Chile, 1996 (Imperial Gala)	2.0	0.11	3	7	1.6, 2.0	AA950314.05 95-0064
Chile, 1996 (Royal Gala)	2.0	0.11	3	7	3.2, 3.7	AA950314.06 95-0064
France (north), 1996 (Star Crimson)	0.98	0.10	11	14	0.9, 0.6, 0.7 0.7, 0.8, 0.5	MAK/374-08 R-9162
France (north), 1996 (Star Crimson)	1.0	0.10	11	14	0.7, 1.4, 0.7 0.8, 0.8, 0.6	MAK/374-09 R-9162
France (south), 1996 (Golden Delicious)	1.2	0.10	9	14	1.8, 1.2, 1.8 1.1, 1.5, 1.0	MAK/374-06 R-9162
France (south), 1996 (Golden Delicious)	0.98	0.10	9	14	1.2, 1.4, 0.8 0.7, 0.7, 1.4	MAK/374-07 R-9162
Germany, 1985 (Gloster)	0.75	10×0.075 +0.15	10 11	24 3	0.81 0.85	BBA 85/Ob/12885[1]
Germany, 1985 (Gloster)	0.75	10×0.075 +0.15	10 11	24 3	0.84 0.81	BBA 85/Ob/12885
Germany, 1985 (Gloster)	0.75	10×0.075 +0.3	10 11	24 3	0.54 0.83	BBA 85/Ob/12885
Germany, 1985 (Gloster)	10×0.75 +0.5	10×0.075 +0.1	10 11	24 3	0.32 0.52	BBA 85/Ob/12885
Germany, 1985 (Gloster)	10×0.75 +0.5	10×0.075 +0.2	10 11	24 3	0.54 0.61	BBA 85/Ob/12885
Germany, 1985 (Gloster)	10×0.75 +0.5	10×0.075 +0.2	10 11	24 3	0.32 0.43	BBA 85/Ob/12885

Country year (variety)	Application			PHI, days	Folpet, mg/kg	Ref
	kg ai/ha	kg ai/hl	no.			
Hungary, 1996 (Star King)	1.6	0.10	8	10	5.4, 4.4, 5.1 6.5, 5.9, 8.0	MAK374-01 R-9162
Portugal, 1996 (Jonagold Red)	1.6	0.13	8	21	2.7, 2.8, 2.6 3.0, 3.2, 2.3	MAK/374-05 R-9162
Portugal, 1996 (Jonagold Red)	3.1	0.26	8	21	5.5, 10.8, 9.9	MAK/374-05 R-9162
Spain, 1996 (Red Mornet)	1.9	0.16	6	10	1.7, 2.0, 3.1 2.2, 2.3, 1.7	MAK/374-04 R-9162
Spain, 1996 (Red Mornet)	3.7	0.31	6	10	6.9, 4.1, 3.0	MAK/374-04 R-9162
Switzerland, 1996 (Fiorina)	2.0	0.10	4	21	2.2, 3.1, 2.8 2.7, 3.4, 3.3	MAK/374-03 R-9162
USA (NY), 1995 (Northern Spy)	2.9	0.31	4	7	2.1	SARS-95-50 95-0059

[1]All BBA trials only reported on summary sheets

Table 10. Folpet and phthalimide residues in grapes resulting from supervised trials in Argentina, Chile, France, Germany, Italy and Mexico. Residues in replicate field samples from single plots are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
Argentina, 1996 (Emperador)	WP	1.0	0.13	4	7	1.6, 1.5		R-9141g AA950313.07 95-0071
Chile, 1996 (Red Globe)	WP	2.0	0.15	3	14	1.8, 2.6		R-9141g AA950313.06 95-0071
Chile, 1996 (Red Globe)	WP	2.0	0.15	3	14	1.5, 3.0		R-9141g AA950313.08 95-0071
France (Beaune), 1992	WG	1.5		8	27	1.9, 0.73, 0.88, 0.93	0.21, 0.095, 0.062, 0.091	R-7194a
					52	0.58, 0.56, 0.46, 0.68	0.071, 0.057, 0.052, 0.071	
France (Bordeaux), 1992	WG	1.5		7	0	3.6, 2.5, 2.5, 2.9	0.20, 0.18, 0.18	R-7194
					21	0.47, 1.6, 0.95, 0.39	0.18, 0.33, 0.24, 0.13	
					60	0.52, 0.14, 0.23, 0.50	0.16, 0.091, 0.091, 0.17	
France (Orange), 1992	WG	1.5		12	0	1.1, 1.5, 3.8, 6.5 c0.066	0.50, 0.31, 0.94, 1.4 c00.070	R-7194a
					15	1.8, 4.3, 1.3, 2.0 c0.098	0.94, 0.91, 0.52, 0.91 c00.11	
					30	0.76, 1.1, 0.42, 0.22 c0.057	0.48, 0.53, 0.31, 0.28 c0.056	
France, 1994 (Ugni blanc)	SC	1.5	0.43	6	52	2.8 0.27 m <0.01 w <0.01 sp		R-8411 R 5011 9401-MAK 94-66-06-22
France, 1994 (Ugni blanc)	WG	1.5	0.43	6	52	2.9 0.73 m <0.01 w <0.01 sp		R-8411 R 5011 9401-MAK 94-66-06-22

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
France, 1995 (Carignan)	SC	1.6	0.50	7 8	8 0 7 14 21	3.9, 8.1 8.3, 9.0 10.6, 7.1 4.4, 6.0 2.2, 2.2 c 0.012		EA950170 R-9146 FR03
France, 1995 (Chardonnay)	SC	1.4	0.50	8	21	2.4, 2.2		EA950170 R-9146 FR02
France, 1995 (Merlot)	SC	1.5	0.47	8	21	3.1, 2.3		EA950170 R-9146 FR01
France, 1995 (Pinot Noir)	SC	1.5	0.60	8 9	10 0 7 14 21	3.7, 3.1 6.1, 7.2 4.8, 4.0 3.2, 2.5 2.8, 2.3 c 0.06, 0.07 c 0.10, 0.06		EA950170 R-9146 FR04
Germany, 1993 (Müller-Thurgau)	WP	0.6+0.9 +1.5+1.8 +2×2.2 +2×2.6	2×0.17 +2×0.26 +2×0.30 +2×0.35	8	14 28 35 28 28	0.91 0.66 0.66 0.68 m <0.05 w	<0.1 <0.1 <0.1 0.27 m 0.29 w	R-7993 HVA 7/94 UHL08
Germany, 1993 (Müller-Thurgau)	WP	0.7+1.0 +1.7+2.0 +2×2.3 +2×2.6	2×0.17 +0.28 +0.33 +2×0.39 +2×0.44	8	7 14 27 35 27 27	1.4 1.5 1.5 1.5 0.58 m <0.05 w	<0.1 <0.1 0.1 <0.1 0.44 m 0.47 w	R-7993 HVA 7/94 UHL10
Germany, 1993 (Müller-Thurgau)	WP	0.6+0.9 +1.6+1.9 +2.2+2.3 +2.6+2.5	2×0.16 +0.27 +0.32 +0.37 +2×0.43	8	7 14 28 35 28 28	1.0 1.6 1.1 0.51 0.27 m <0.05 w	<0.1 <0.1 <0.1 <0.1 0.39 m 0.39 w	R-7993 HVA 7/94 UHL12
Germany, 1993 (Müller-Thurgau)	SC	0.38+0.54 +0.91+1.1 +2×1.3 +2×1.5	2×0.1 +0.13 +0.16 +2×0.18 +2×0.21	8	14 28 35 28 28	2.1 1.2 0.41 0.25 m <0.05 w	<0.1 <0.1 <0.1 0.26 m 0.31 w	R-7993 HVA 7/94 UHL14
Germany, 1993 (Müller-Thurgau)	SC	0.39+0.60 +1.0+1.2 +2×1.4 +2×1.6	2×0.1 +0.17 +0.20 +2×0.23 +2×0.27	8	7 14 28 35 28 28	0.77 1.1 0.42 0.40 0.27 m <0.05 w	<0.1 <0.1 <0.1 <0.1 0.37 m 0.35 w	R-7993 HVA 7/94 UHL16
Germany, 1993 (Portugieser)	WP	0.7+1.0 +1.7+2.0 +2.3+2.5 +2×2.7	2×0.17 +0.28 +0.33 +2×0.39 +2×0.44	8	7 14 28 35 28 28	3.5 1.9 2.0 2.0 <0.05 m <0.05 w	<0.1 <0.1 <0.1 <0.1 1.8 m 0.99 w	R-7993 HVA 7/94 UHL09
Germany, 1993 (Portugieser)	SC	0.39+0.60 +1.0+1.1 +2×1.4 +2×1.6	2×0.1 +0.17 +0.20 +2×0.23 +2×0.27	8	7 14 28 35 28 28	1.7 0.54 0.29 0.23 <0.05 m <0.05 w	<0.1 <0.1 <0.1 <0.1 0.44 m 0.33 w	R-7993 HVA 7/94 UHL15

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
Germany, 1993 (Reisling)	WP	0.63+0.89 +1.3+1.5 +1.7+2.0 +2× 1.3	0.17	8	0 14 28 35 28 28	9.7 2.2 5.6 4.7 0.83 m <0.05 w	<0.1 <0.1 0.2 <0.1 0.72 m 0.76 w	R-7993 HVA 7/94 UHL07
Germany, 1993 (Reisling)	WG	0.6+1.0 +1.6+1.9 +2× 2.2 +2.5+2.6	0.16+0.17 +0.27 +0.32 +2× 0.37 +2× 0.43	8	0 14 28 35 28 28	2.9 1.3 1.3 1.4 <0.05 m <0.05 w	<0.1 <0.1 <0.1 0.12 0.51 m 0.34 w	R-7993 HVA 7/94 UHL11
Germany, 1993 (Reisling)	SC	0.6+0.8 +1.2+1.4 +1.5+1.8 +2× 1.2	0.1	8	0 14 28 35 28 28	12 5.6 3.3 1.9 1.0 m <0.05 w	<0.1 <0.1 0.1 <0.1 0.92 m 0.83 w	R-7993 HVA 7/94 UHL13
Italy, 1996 (Italia)	WG	1.6	0.16	5	10	3.3, 2.9		R-9141g AA950313.03 95-0071
Italy, 1996 (Rondinella)	WG	1.6	0.16	5	41	1.7, 1.7		R-9141g AA950313.04 95-0071
Mexico, 1996 (Perleete)	WP	1.0	0.14	7	10	<0.05, <0.05)		R-9141g AA950313.05 95-0071

c: control sample m: must. w: wine sp: spirit

Table 11. Folpet residues in strawberries resulting from supervised trials in Italy, Mexico and The Netherlands. Residues in replicate field samples from single plots and from duplicate plots in the same trial are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	No.			
Italy, 1995 (Addie)	WP	1.3+3×1.2	0.13	4	0 7 10 14	0.70 0.22 0.10 0.07	R-8986 DA-10/915 IT 219/95
Italy, 1995 (Belruby)	WP	0.84+0.92 +0.89	0.15	3	0 7 14 21	0.86 0.09 <0.01 <0.01	R-8989 95I005R 95046/I1-FFST
Mexico, 1995 (Sweet Charlie)	WP	3×1.3+1.2	2×0.50 +0.52+0.62	4	2	1.7, 1.8	R-9141s 950310.01 95-0068
Mexico, 1995 (Sweet Charlie)	WP	1.2	0.31+3×0.26	4	2	0.92, 1.6	R-9141s 950310.02 95-0068
Mexico, 1995 (Seascape)	WP	1.2	0.38+0.32 +2×0.33	4	2	2.0, 2.2	R-9141s 950310.03 95-0068
Netherlands, 1996 (Elsanta)	WP	1.3+1.4	0.13	2 pt	14	1.3, 0.7, 1.2 1.0, 1.1, 1.9	R-9161 MAK/372-01
Netherlands, 1996 (Elsanta)	WP	2.7	0.27	2 pt	14	1.8, 2.0, 2.6	R-9161 MAK/372-01
Netherlands, 1996 (Elsanta)	WG	1.3	0.13	2 pt	14	0.4, 1.6, 0.8 0.8, 1.2, 1.0	R-9161 MAK/372-01

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	No.			
Netherlands, 1996 (Elsanta)	WP	1.4+1.3	0.13	2 pt	14	1.0, 1.4, 1.2 1.0, 0.7, 1.0	R-9161 MAK/372-02
Netherlands, 1996 (Elsanta)	WP	2.7	0.27	2 pt	14	3.0, 3.6, 1.8	R-9161 MAK/372-02

pt: plastic tunnel

Table 12. Folpet residues in bulb onions resulting from supervised trials in Chile, Hungary, Greece, Mexico, Portugal and Spain. Residues in replicate field samples from single plots or from duplicate plots in the same trial are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels. Samples from European trials include roots and foliage.

County, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref.
	Form	kg ai/ha	kg ai/hl	no.			
Chile, 1996 (Grano de oro)	WP	2.0	0.13	3	7	0.36, 0.27	R-9140 AA950307.03 95-0070
Greece, 1996 (Banko)	SC	0.62 +0.61+0.62	0.12	3	20	<0.05, <0.05	R-9163 MAK/377-07
Greece, 1996 (Moranda)	SC	2×0.61 +0.62	0.12	3	20	<0.05, <0.05	R-9163 MAK/377-06
Hungary, 1996 (Deutona)	WP	0.40 +0.66+0.65	0.13	3	14	<0.05, 0.07	R-9163 MAK/377-02
Hungary, 1996 (Deutona)	WP	0.75 +2×1.3	0.26	3	14	0.2	R-9163 MAK/377-02
Hungary, 1996 (Makoi Bronz)	WP	0.40 +0.67+0.65	0.13	3	14	<0.05, <0.05	R-9163 MAK/377-03
Hungary, 1996 (Makoi Bronz)	WP	0.39 +0.65+0.67	0.13	3	14	0.21, 0.09	R-9163 MAK/377-04
Hungary, 1996 (Piroschka)	WP	0.39 +2×0.65	0.13	3	14	0.05, <0.05	R-9163 MAK/377-01
Hungary, 1996 (Piroschka)	WP	0.75 +2×1.3	0.26	3	14	1.0	R-9163 MAK/377-01
Mexico, 1995 (Suprema)	WP	1.5	2×0.56 +0.36+0.51	4	7	0.41, 0.31	R-9141 AA950307.01 95-0070
Mexico, 1995 (Suprema)	WP	1.5	3×0.37 +0.56	4	7	0.41, 0.32	R-9141 AA950307.02 95-0070
Portugal, 1996 (Valenciana tardia)	WP	0.53 +0.54+0.54	0.13	3	7	5.0, 3.6	R-9163 MAK/377-08
Spain, 1996 (Dulce Babosa)	WP	0.62 +2×0.65	0.16	3	10	1.6, 2.5	R-9163 MAK/377-09

Table 13. Folpet residues in cucumbers and melons resulting from supervised trials in Canada, Greece, Guatemala, Honduras and Mexico. Residues in replicate field samples from single plots are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Cucumbers							

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Canada, 1996 (Panther)	WP	1.0	0.10	8	7	<0.05, 0.073	AA950312.05 95-0065
Mexico, 1995 (Dasher)	WP	1.8	0.50	4	3	0.11, 0.075	AA950312.04 95-0065
Mexico, 1995 (Fancipack)	WP	1.7	0.76	4	3	0.18, 0.36	AA950312.03 95-0065
Mexico, 1995 (pickle)	WP	1.8	0.82+0.78 +0.83+0.67	4	3	0.70, 0.41	AA950312.01 95-0065
Mexico, 1996 (Fancipack)	WP	1.8	0.79	4	3	0.55, 0.56	AA950312.02 95-0065
Melons							
Greece, 1996	SC	0.49	0.061	4	20	<0.05, <0.05	R-9159 MAK/373-03
Greece, 1996	SC	0.49	0.061	4	20	<0.05, <0.05	R-9159 MAK/373-04
Greece, 1996 (Galia)	SC	0.49	0.061	4	20	<0.05, <0.05	R-9159 MAK/373-02
Greece, 1996 (Macmidon)	SC	0.49	0.061	4	20	<0.05, <0.05	R-9159 MAK/373-01
Greece, 1996 (Macmidon)	SC	0.98	0.12	4	20	<0.05	R-9159 MAK/373-01
Greece, 1996 (Macmidon)	SC	0.97	0.12	4	20	<0.05	R-9159 MAK/373-02
Guatemala, 1996 (Cristobal)	WP	0.49	0.10	6	3	0.23, 0.21	R-9141m AA950308.06 95-0067
Honduras, 1996 (Hy-Mark)	WP	0.65	0.13	4	3	0.32, 0.17	R-9141m AA950308.04 95-0067
Honduras, 1996 (Hy-Mark)	WP	0.65	0.13	4	3	0.20, 0.41	R-9141m AA950308.05 95-0067
Mexico, 1996 (Cruiser F1)	WP	1.8	0.86+0.87 +0.85+0.84 +2×0.79	6	7	2.2, 0.94	R-9141m AA950308.01 95-0067
Mexico, 1996 (Cruiser)	WP	1.8+1.6 +1.9+1.8 +1.9+1.8	0.62+0.44 +0.55+0.54 +0.54+0.55	6	7	0.89, 0.72	R-9141m AA950308.02 95-0067
Mexico, 1996 (Hiline)	WP	1.8	0.63	6	7	0.30, 0.40	R-9141m AA950308.03 95-0067

Table 14. Folpet residues in tomatoes resulting from supervised trials in Chile, Hungary, Italy, Mexico, Portugal, Spain and USA. Residues in replicate field samples from single plots or from duplicate plots in the same trial are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Chile, 1996 (Conservo)	WP	1.7	1.5	7	7	1.4, 2.4	R-9141t AA950311.06 95-0069
Hungary, 1996 (Kecskemet 407)	WP	0.65	0.13	3	14	<0.05, <0.05	R-9158 MAK/375.01
Hungary, 1996 (Kecskemet 407)	WP	1.3	0.26	3	14	0.098	R-9158 MAK/375.01
Hungary, 1996 (Koral)	WP	1.3	0.26	3	14	0.06	R-9158 MAK/375.02
Hungary, 1996 (Koral)	WP	0.66+0.64 +0.65	0.13	3	14	<0.05, <0.05	R-9158 MAK/375.02
Hungary, 1996 (Prima)	WP	0.65	0.13	3	14	<0.05, <0.05	R-9158 MAK/375.04
Hungary, 1996 (Rio Fiego)	WP	2×0.65 +0.66	0.13	3	14	<0.05, <0.05	R-9158 MAK/375.03
Italy, 1995 (UC 82 VF)	WP	1.2	0.13	4	0 7 10 14	0.95 0.55 0.60 0.20	R-8987 IT 217/95 DA-12/95
Mexico, 1995 (Rio Grande)	WP	2.0	0.58+0.72 +0.67+0.66 +0.67	5	2	0.86, 1.0	R-9141t AA950311.01 95-0069
Mexico, 1995 (SM10)	WP	2.0	0.96+0.91 +0.80 +2×0.71	5	2	0.81, 1.6	R-9141t AA950311.04 95-0069
Mexico, 1995 (SM10)	WP	2.0	0.96+0.86 +0.77 +2×0.66	5	2	1.1, 1.8	R-9141t AA950311.05 95-0069
Mexico, 1996 (Rio Grande Mejorada)	WP	2.0	2×0.80 +0.76+0.75 +0.71	5	2	0.45, 0.33	R-9141t AA950311.02 95-0069
Mexico, 1996 (Rio Grande Mejorada)	WP	2.0	0.87+0.80 +2×0.75 +0.72	5	2	0.64, 1.3	R-9141t AA950311.03 95-0069
Portugal, 1996 (Melero)	WP	1.3	0.16	4	7	0.27, 0.34	R-9158 MAK/375.08
Portugal, 1996 (Petto 95)	WP	1.3	0.16	4	7	0.28, 0.58	R-9158 MAK/375.09
Spain, 1996 (Petto 95)	WP	1.6	0.26 +5×0.20	6	10	1.3, 0.36	R-9158 MAK/375.06
Spain, 1996 (Prieto)	WP	2×1.6 +2×2.2 +2×2.5	0.26 +5×0.16	6	10	0.99, 1.2	R-9158 MAK/375.07
USA, 1995 (Peel Mech)	WP	2.2	0.58	5	7	1.8 <0.05 purée <0.05 paste	R-9101 SARS-95-51 95-0060

Table 15. Folpet residues in head and leaf lettuce resulting from supervised trials in Greece, Hungary, Mexico, Portugal and Spain and from lamb's lettuce from trials in Germany. Residues in replicate field samples from single plots or from duplicate plots in the same trial are shown separately. Double-underlined residues are from treatments according to GAP and are valid for the estimation of maximum residue levels.

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	No.			
Head Lettuce							
Greece, 1996 (Crispa)	SC	0.61	0.12	3	20	<0.05, <0.05	R-9160 MAK/378-07
Hungary, 1996 (Chagal)	WP	0.64 -0.66	0.13	pt 3	14	18, 24	MAK/378-01 MAK378/970321
Hungary, 1996 (Chagal)	WP	1.3	0.26	pt 3	14	50	MAK/378-01 MAK378/970321
Hungary, 1996 (Mildred)	WP	0.65 -0.67	0.13	pt 3	14	29, 21	MAK/378-02 MAK378/970321
Hungary, 1996 (Mildred)	WP	1.3	0.26	pt 3	14	61	MAK/378-02 MAK378/970321
Hungary, 1997 (Oktavo)	WP	0.65	0.13	pt 3	14	12, 9.9	MAK/378-04 MAK378/970321
Hungary, 1997 (Vicky)	WP	0.63 -0.66	0.13	pt 3	14	39, 25	MAK/378-03 MAK378/970321
Mexico, 1995 (Great Lakes 407P)	WP	1.3	0.36+0.42 +0.41 +2×0.44	5	7	1.6, 4.5	AA950309.03 95-0066
Mexico, 1996 (Climax)	WP	1.3	0.46+3×0.45 +0.40	5	7	3.2, 9.8	AA950309.02 95-0066
Mexico, 1996 (Top Gun)	WP	1.3	0.44+0.42 +2×0.41 +0.46	5	7	wl (16, 15) xwl (0.22, 0.26)	AA950309.04 95-0066
Portugal, 1996 (Grand rapids)	WP	0.52	0.13	3	14	4.3, 2.4	R-9160 MAK/378-09
Leaf lettuce							
Greece, 1996 (Romana)	SC	0.63	0.12	4	20	<0.05, <0.05	R-9160 MAK/378-06
Mexico, 1996 (Parris Island)	WP	1.2	0.58+2×0.57 +0.56+0.60	5	7	19, 22	AA950309.01 95-0066
Spain, 1996 (Romana)	WP	0.78	0.16	4	21	<0.05, <0.05	R-9160 MAK/378-08
Lamb's lettuce							
Germany, 1975 (Polar)	WP	0.68	0.096	3	10	55	BBA 15/75
Germany, 1975 (Hild's Vit-Neuheit)	WP	0.68	0.096	2	10	56	BBA 15/75
Germany, 1976 (Stuttgarter)	WP	0.68	0.15	4	15	54	BBA 15/75
Germany, 1976 (Stuttgarter)	WP	0.68	0.15	4	15	51	BBA 15/75
Germany, 1975 (Felma GS)	WP	0.68	0.11	4	11	10	BBA 15/75
Germany, 1975 (Dunkelgrüner Vollherziger)	WP	0.68	0.11	4	10	66	BBA 15/75
Germany, 1975 (Hollander)	WP	0.68	0.11	4	10	44	BBA 15/75
Germany, 1975 (Holländischer Breitblättriger)	WP	0.68	0.11	4	10	12, 20	BBA 14/75
Germany, 1975 (Hilmar)	WP	0.68	0.11	4	10	20	BBA 14/75
Germany, 1975 (Dunkelgrüner Vollherziger)	WP	0.68	0.11	4	10	22, 22	BBA 14/75
Germany, 1975 (Felma GS)	WP	0.68	0.11	4	10	211	BBA 14/75
Germany, 1975 (Dunkelgrüner Vollherziger)	WP	0.68	0.11	4	10	188	BBA 14/75
Germany, 1975 (Stuttgarter Markt)	WP	0.68	0.096	3	10	1.3 c 14	BBA 14/75

Country, year (variety)	Application				PHI, days	Folpet, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	No.			
Germany, 1975 (Stuttgarter Markt)	WP	0.68	0.084	3	10	33 c 6.7	BBA 14/75
Germany, 1975 (Stuttgarter Markt)	WP	0.68	0.096	2	14	5.6	BBA 14/75
Germany, 1975 (Dunkelgroßer Vollherziger)	WP	0.68	0.11	3	15	2.4	BBA 14/75

c: control
pt: plastic tunnels
wl: with wrapper leaves
xwl: without wrapper leaves

Table 16. Interpretation table for folpet residues on apples from trials in Table 9 and from 1993 Evaluations. GAP and trial conditions are compared for treatments considered valid for MRL and STMR estimation.

	Use pattern				Trials	Folpet, mg/kg
	kg ai/ha	kg ai/hl	No of appl	PHI, days		
Argentina GAP	3.6	0.12	3	10		
Argentina trials	3.6	0.12	3	10	AA950314.07	1.4
Argentina trials	3.6	0.12	3	10	AA950314.08	2.6
Canada GAP	0.8	0.10	8	7		
Canada trial	0.78	0.10	8	7	AA950314.01	1.4
Canada trial	0.81	0.10	8	7	AA950314.02	0.43
Canada trial	0.81	0.10	8	7	AA950314.03	1.1
Canada trial	0.81	0.10	8	7	AA950314.04	0.65
Chile GAP	2.0	0.11	3	7		
Chile trial	2.0	0.11	3	7	AA950314.05	2.0
Chile trial	2.0	0.11	3	7	AA950314.06	3.7
Hungary GAP	1.6	0.10	8	10		
Hungary trials	1.6	0.10	8	10	MAK374-01	8.0
Switzerland GAP	2.0	0.10	4	21		
Switzerland trial	2.0	0.10	4	21	MAK/374-03	3.4
Spain GAP	1.9	0.16	6	10		
Spain trial	1.9	0.16	6	10	MAK/374-04	3.1
Portugal GAP	1.6	0.13	8	21		
[1]Portugal trial	1.3	0.13	10	21	FP/25/91	1.8
Portugal trial	1.6	0.13	8	21	MAK/374-05	3.2
France (nth) GAP	1.04	0.14	11	14		
France (nth) trial	0.98	0.10	11	14	MAK/374-08	0.9
France (nth) trial	1.0	0.10	11	14	MAK/374-09	1.4
France (sth) GAP	1.2	0.12	9	14		
France (sth) trial	1.2	0.10	9	14	MAK/374-06	1.8
France (sth) trial	0.98	0.10	9	14	MAK/374-07	1.4

Table 17. Interpretation table for folpet residues on grapes from trials in Table 10 and from 1993 Evaluations. GAP and trial conditions are compared for treatments considered valid for MRL and STMR estimation.

	Use pattern	Trial	Folpet, mg/kg

[1] From 1993 JMPR

	kg ai/ha	kg ai/hl	No of appl	PHI days		
Mexico GAP	1	0.25	7	10		
Mexico trial	1.0	0.14	7	10	AA950313.05	<0.05
Chile GAP	2.0	0.15	3	14		
Chile trial	2.0	0.15	3	14	AA95013.06	2.6
Chile trial	2.0	0.15	3	14	AA95013.08	3.0
Argentina GAP	1.02	0.13	4	7		
Argentina trial	1.0	0.13	4	7	AA950313.07	1.6
Italy GAP	1.6	0.16	5	10		
Italy trial	1.6	0.16	5	10	AA950313.03	3.3
France trial	1.5	0.60	8	10	R-9146 FR04	3.7
France trial	1.6	0.50	7	8	R-9146 FR03	8.1
Italy trial	1.5	0.25	7	10	IT-302-91	0.75
Italy trial	1.5	0.15	10	10	IT-301-91	0.58
France trial	1.5	1.1	7	10	102/91	1.3
France trial	1.5	1.9	7	10	103/91	2.2

Table 18. Interpretation table for folpet residues on melons from trials in Table 13. GAP and trial conditions are compared for treatments considered valid for MRL and STMR estimation.

	Use pattern				Trial	Folpet, mg/kg
	kg ai/ha	kg ai/hl	No.	PHI days		
Mexico GAP	1.8	0.88	6	7		
Mexico trial	1.8	0.79	6	7	AA950308.01	2.2
Mexico trial	1.8	0.55	6	7	AA950308.02	0.89
Mexico trial	1.8	0.63	6	7	AA950308.03	0.40
Honduras GAP	0.64	0.21	4	3		
Honduras trial	0.65	0.13	4	3	AA950308.04	0.32
Honduras trial	0.65	0.13	4	3	AA950308.05	0.41
Guatemala GAP	0.48	0.24	6	3		
Guatemala trial	0.49	0.1	6	3	AA950308.06	0.23
Greece GAP	0.49	0.061	4	20		
Greece trial	0.49	0.061	4	20	MAK/373-01	<0.05
Greece trial	0.98	0.12	4	20	MAK/373-01	<0.05
Greece trial	0.49	0.061	4	20	MAK/373-02	<0.05
Greece trial	0.97	0.12	4	20	MAK/373-02	<0.05
Greece trial	0.49	0.061	4	20	MAK/373-03	<0.05
Greece trial	0.49	0.061	4	20	MAK/373-04	<0.05

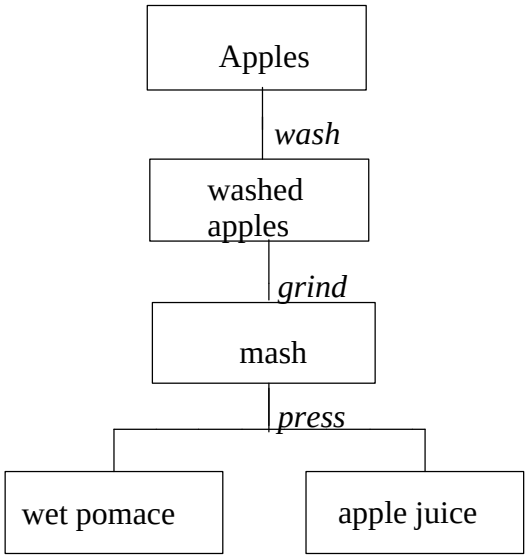
Table 19. Interpretation table for folpet residues on tomatoes from trials in Table 14 and from 1993 Evaluations. GAP and trial conditions are compared for treatments considered valid for MRL and STMR estimation.

	Use pattern				Trial	Folpet, mg/kg
	kg ai/ha	kg ai/hl	No of appl	PHI days		folpet
Chile GAP	1.7	0.15	7	7		
Chile trial	1.7	1.5	7	7	AA950311.06	2.4
Hungary GAP	0.65	0.13	3	14		
Hungary trial	0.63	0.12	5	14	FP/26/91	<0.02
Hungary trial	0.65	0.13	3	14	MAK/375.01	<0.05
Hungary trial	0.65	0.13	3	14	MAK/375.02	<0.05
Hungary trial	0.65	0.13	3	14	MAK/375.04	<0.05
Hungary trial	0.66	0.13	3	14	MAK/375.03	<0.05
Portugal GAP	1.3	0.16	4	7		

	Use pattern				Trial	Folpet, mg/kg
	kg ai/ha	kg ai/hl	No of appl	PHI days		folpet
Italy trial	1.2	0.13	4	7	IT217/95	0.55
Portugal trial	1.3	0.16	4	7	MAK/375.08	0.34
Portugal trial	1.3	0.16	4	7	MAK/375.09	0.58
Mexico GAP	2.0	1.0	5	2		
Mexico trial	2.0	0.67	5	2	AA950311.01	1.0
Mexico trial	2.0	0.71	5	2	AA950311.04	1.6
Mexico trial	2.0	0.66	5	2	AA950311.05	1.8
Mexico trial	2.0	0.71	5	2	AA950311.02	0.45
Mexico trial	2.0	0.72	5	2	AA950311.03	1.3
Spain GAP	1.6	0.26	6	10		
Spain trial	1.6	0.2	6	10	MAK/375.06	1.3

FATE OF RESIDUES IN STORAGE AND PROCESSING

The Meeting received information on the fate of folpet during the processing of apples, grapes and tomatoes.



Leppert (1996a) applied folpet four times at 2.9 kg ai/ha (0.31 kg ai/hl) with airblast equipment to an apple orchard in a processing trial in the USA (NY). The treated plot was 357 m^2. Apples (49 kg) were harvested 7 days after the final application and processed into wet pomace and juice. The residue levels in the unwashed apples are shown in Table 9, trial SARS-95-50).

Armstrong and Luke (1995) processed the apples to simulate commercial practice as closely as possible. The apples were washed, then ground in a hammer-mill to produce a wet mash which was pressed in a hydraulic press to separate the juice and wet pomace. The results and the processing factors are shown in Table 20.

Table 20. Folpet residues in apples, pomace and juice (Leppert 1996a, Armstrong and Luke 1995, Hurley and Farthing 1996e).

Sample	Folpet, mg/kg	Processing factor

Sample	Folpet, mg/kg	Processing factor
Apples, unwashed	2.1	
Apples, washed	1.2	0.60
Wet pomace	5.4	2.6
Juice	0.072	0.035

Singer (1997g) dipped 74 kg of grapes (Thomson Seedless) in 7-10 kg portions for 30 seconds in a vat containing folpet spray mixture at a concentration of 1.25 kg ai/hl, five times the maximum concentration permitted on grapes in Mexico. The grapes were then allowed to dry on polythene sheeting. Because folpet was shown in the metabolism studies to be a surface residue it was considered valid to treat grapes in this way instead of by field spraying. Abdelrahim (1996) processed the grapes into raisins and juice.

Bunches of the unwashed grapes were spread out on stainless steel screens on tables covered with black plastic and sun-dried until the moisture level had dropped to 12-16% to produce unprocessed raisins, samples of which were stored in a freezer. The remaining dried grapes were collected in plastic bags and kept in an incubator at 21°C until removed for destemming and sampling. After destemming, the dried grapes were returned to the incubator at 21°C and subsequently rehydrated to 18-20% moisture to produce raisins.

The grapes were processed in a crusher/destemmer, which crushes the berries and separates the stems from the crushed berries and juice. The crushed berries and juice were treated with an enzyme, heated at 60°C for 2 hours to remove pectin, and then separated by pressing into unclarified juice and pomace. The juice was heated at 88°C to inactivate the enzyme, filtered through diatomaceous earth, and then placed in cold storage for 6 weeks to allow settling. Clear juice was produced by filtration through diatomaceous earth, heated to canning temperature (94°C) and run into cans which were then sealed. The residues and processing factors are shown in Table 21 (Farthing, 1996d).

Table 21. Folpet residues in grapes, juice and raisins after dipping the grapes in a vat containing a 1.25 kg ai/hl folpet spray mixture (Singer, 1997g; Abdelrahim, 1996; Farthing, 1996d).

Sample	Folpet, mg/kg	Processing factor
Grapes	19, 12, 15, 17, 14, 14	
Grape juice	<0.05 (3)	0 (<0.003)
Raisins before rehydration	58, 41, 46	3.2
Hydrated raisins	31, 28, 27	1.9

Folpet residues were not detected in the grape juice and were presumably lost in the filtration and/or heating steps. Residues were concentrated during the drying process to produce raisins.

In two trials in France, Wasser (1996) treated grapes 6 times with folpet (SC and WG formulations) at 1.5 kg ai/ha and harvested them 52 days after the final application. Folpet residues were determined in the grapes and the must, wine and spirits prepared from them. The results are shown in Table 10 (trials R 5011). Some folpet residues appeared in the must, but none in the wine or spirits.

Folpet and phthalimide residues were measured in grapes, must and wine in a series of trials in Germany. The treatment details are recorded in Table 10. The residues in grapes, must and wine and the processing factors are shown in Table 22.

Table 22. Processing factors and residues of folpet and phthalimide in grapes, must and wine after grapes were sprayed with folpet. Application details are provided in Table 10.

Commodity	Residues, mg/kg		Processing factor, folpet	Processing yield, phthalimide[1]	Reference
	folpet	phthalimide			
Grapes	5.6	0.2			R-7993
Must	0.83	0.72	0.15	0.24	HVA 7/94
Wine	<0.05	0.76	0 (<0.009)	0.26	UHL07
Grapes	0.66	<0.1			R-7993
Must	0.68	0.27	0.97	0.83	HVA 7/94
Wine	<0.05	0.29	0 (<0.08)	0.89	UHL08
Grapes	2.0	<0.1			R-7993
Must	<0.05	1.8	0 (<0.03)	1.8	HVA 7/94
Wine	<0.05	0.99	0 (<0.03)	0.99	UHL09
Grapes	1.5	0.1			R-7993
Must	0.58	0.44	0.39	0.52	HVA 7/94
Wine	<0.05	0.47	0 (<0.03)	0.56	UHL10
Grapes	1.3	<0.1			R-7993
Must	<0.05	0.51	0 (<0.04)	0.79	HVA 7/94
Wine	<0.05	0.34	0 (<0.04)	0.53	UHL11
Grapes	1.1	<0.1			R-7993
Must	0.27	0.39	0.25	0.72	HVA 7/94
Wine	<0.05	0.39	0 (<0.05)	0.72	UHL12
Grapes	3.3	0.1			R-7993
Must	1.0	0.92	0.30	0.53	HVA 7/94
Wine	<0.05	0.83	0 (<0.02)	0.48	UHL13
Grapes	1.2	<0.1			R-7993
Must	0.25	0.26	0.21	0.44	HVA 7/94
Wine	<0.05	0.31	0 (<0.04)	0.52	UHL14
Grapes	0.29	<0.1			R-7993
Must	<0.05	0.44	0 (<0.17)	3.1	HVA 7/94
Wine	<0.05	0.33	0 (<0.17)	2.3	UHL15
Grapes	0.42	<0.1			R-7993
Must	0.27	0.37	0.64	1.8	HVA 7/94
Wine	<0.05	0.35	0 (<0.12)	1.7	UHL16

[1]See definition of processing yield below

The processing factors for folpet residues in the process from grapes to must and wine were calculated by dividing the folpet residue level in the must and wine by the residue level in the grapes. The processing factors for folpet from grapes to must were 0, 0, 0, 0.15, 0.21, 0.25, 0.30, 0.39, 0.64 and 0.97, with a mean of 0.29. Folpet was not detected in the wine so the processing factor for folpet from grapes to wine is 0.

Phthalimide residues in the must and wine may arise by transfer of phthalimide from the grapes or conversion of folpet to phthalimide during processing. Processing yields for phthalimide have been calculated from the following formula.

$$\text{Processing yield} = \frac{\text{phthalimide residue in must or wine}}{\text{folpet residue in grapes x 0.496 + phthalimide residues in grapes}}$$

The factor 0.496 is the ratio of the molecular weight of phthalmimide (147.13) to that of folpet (296.55).

The processing yields for phthalimide from grapes to must were 0.24, 0.44, 0.52, 0.53, 0.72, 0.79, 0.83, 1.8, 1.8 and 3.1. The mean was 1.1.

The processing yields for phthalimide from grapes to wine were 0.26, 0.48, 0.52, 0.53, 0.56, 0.72, 0.89, 0.99, 1.7 and 2.3, with a mean of 0.90. These results suggest that most of the folpet on the grapes is converted to phthalimide which finds its way into wine during vinification.

Leppert (1996b) applied folpet five times at 2.2 kg ai/ha (0.58 kg ai/hl) to tomato plants in a processing trial in California. The treated plot was 186 m^2. Tomatoes (152 kg) were harvested 7 days after the final application and processed into purée and paste. The residues in the unwashed tomatoes and processed commodities are shown in Table 14 (trial SARS-95-51).

The tomatoes were initially soaked with 0.5% sodium hydroxide for 3 minutes and then rinsed with a high pressure spray for 30 seconds. The washed tomatoes were crushed, rapidly heated and held for 15 seconds in a steam-jacketed kettle, then separated into pulp and juice. Purée was produced from the juice by evaporation, adjustment of salt and water levels, heating and canning. Paste was produced similarly, but with a higher salt level.

Folpet was not detected (<0.05 mg/kg) in the purée or paste produced from tomatoes containing 1.8 mg/kg of folpet. It is likely that the initial vigorous cleaning of the tomatoes would remove or destroy most of the folpet. The calculated processing factor for the transfer of folpet from tomatoes to purée and paste is <0.028.

Residues in the edible portion of food commodities

A trial on head lettuce in Mexico provided evidence that almost all of the folpet residue was on the wrapper leaves.

The processing factor for folpet residues from unwashed apples to apple juice was 0.035.

Folpet residues were not detected (<0.05 mg/kg) in grape juice produced from folpet-treated grapes containing 12-19 mg/kg. The processing factors for producing dry raisins and hydrated raisins were 3.2 and 1.9 respectively.

Folpet residues were not detected (<0.01 mg/kg) in wine or spirits produced from treated grapes in France, and not detected (<0.05 mg/kg) in wine from treated grapes in a series of trials in Germany. The mean processing yield for phthalimide in wine in the German trials was 0.90, suggesting that most of the folpet on the grapes was converted to phthalimide during vinification.

Folpet residues were not detected (<0.05 mg/kg) in purée or paste produced from tomatoes containing 1.8 mg/kg of folpet.

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

Cugier (1992) reported a 3-year survey for 1990-1992 of residues in grapes and wine in France. Of the 57 grape samples analysed for folpet, residues were detected (with an LOD of 0.05 mg/kg) in 13 and none exceeded the French MRL of 3 mg/kg. Folpet was not detected (LOD 0.02 mg/kg) in the 7 wines analysed.

NATIONAL MAXIMUM RESIDUE LIMITS

The Meeting was aware that the following MRLs had been established for folpet in apples, cucumbers, grapes, lettuce, melons, onions, strawberries and tomatoes.

Country	MRL, mg/kg							
	Apple	Cucumber	Grape	Lettuce	Melon	Onion	Strawberries	Tomato
Argentina	10	15	15		15	2	15	15
Austria	3	0.1	3	2	0.1	0.1	3	3
Belgium	3	0.1	3	2	0.1	0.1	3	3
Brazil	10	2	15	15	2	2	20	
Canada	25	15	25	25	15		25	25
Chile	25		25		15		25	25
Costa Rica	25	15	25	50	15	15	25	25
Croatia	2		2					
Czech Rep	2		2					
Ecuador	25	15	25	50	25	25	25	25
EEC[1]	3		3	2			3	3
France	3	0.1	3	2	0.1	0.1	3	3
Germany	3	0.1	3	2	0.1	0.1	3	3
Greece		3	3	2	3	3	3	3
Guatemala	25	15	25	50	15	15	25	25
Hungary	2	2	5t, 2w[2]	5	5	5	5	5
Israel	10	0.5						
Italy	3	0.1	3	2	0.1	0.1	0.1	3
Korea	5	5	5	2	2	2	5	2
Macedonia	2		2					
Mexico	25	15	25	50	15	15	25	25
Netherlands	3	0.1	3	2	0.1	0.1	3	3
Portugal	3		3	2	0.1	0.1	0.1	3
Romania	2		2					
Slovakia	2		2					
Sth Africa			15					
Spain	3	0.1	3	2	0.1	0.1	3	3
Sweden	3	0.1	3	2	0.1	0.1	3	3
Switzerland	3		15		3			
Uruguay	10	2	25	15	2	2	20	20
USA	25	15	25	50	25	25	25	25
Yugoslavia	2		2					

[1]Directive 76/893 EEC
T: table w: wine

APPRAISAL

Residue aspects of folpet were most recently reviewed in 1993 and 1994. The Meeting received information on metabolism, analytical methods, stability of samples during freezer storage, registered uses, data from supervised trials on fruit and vegetable crops, and processing studies.

The Meeting noted that folpet was scheduled for periodic review by the FAO Panel in 1998.

When the roots of tomato plants were treated with [*carbonyl*-^{14}C]folpet the ^{14}C was rapidly absorbed into the plants (85% within 1 day). After 11 days 90% of the absorbed ^{14}C was in the tops. Folpet itself was a very minor constituent (<0.1-0.2%) of the residue within the plant. The main identified components were phthalimide, phthalamic acid and phthalic acid. Unidentified polar metabolites, possibly ring-hydroxylated phthalamic acid derivatives, accounted for 15-30% of the ^{14}C in the tops.

When wheat was treated with [*phenylene*-^{14}C]folpet at a rate equivalent to 1.6 kg ai/ha and harvested 43 and 54 days after the second treatment the levels of ^{14}C were lower in the roots than in

the straw or grain. Folpet was the major component of the residue in the straw (4.7 mg/kg) and grain (9.3 mg/kg) with the metabolites phthalic acid (4.3 mg/kg in straw and 6.4 mg/kg in grain) and phthalimide (1.5 mg/kg in straw and 3.1 mg/kg in grain) also significant constituents.

When Thomson Seedless grape vines were treated 3 times with [*phenylene*-^{14}C]folpet at a rate equivalent to 1.5 kg ai/ha and the grapes harvested 25 days after the final treatment, surface rinsing removed 26% of the grape residue. Folpet itself constituted 27% of the residue in or on the grapes, and phthalic acid and phthalimide 5.8% and 11% respectively. An unidentified compound in the water-soluble fraction accounted for 41% of the residue. It was very polar and yielded phthalic acid on hydrolysis, so was likely to be a conjugate or conjugates of phthalic acid.

A small avocado tree was treated with 3 foliar applications equivalent to 3.4 kg ai/ha of [*phenylene*-^{14}C]folpet and fruit were harvested at maturity 97 days after the final application. Very little residue was removed by rinsing the fruit, but most of it was extractable with ethyl acetate from the peel and pulp. The residues in or on the fruit were folpet 0.026 mg/kg, phthalimide 0.22 mg/kg and phthalic acid 4.5 mg/kg. Polar and other unidentified residues accounted for about 0.7 mg/kg. Folpet and phthalimide residues were mainly on the peel, but most of the phthalic acid residue was in the pulp.

The 1993 JMPR reviewed the Schlesinger analytical method for residues of folpet and phthalimide. The methods used in the supervised trials on apples, lettuce, melons, onions, strawberries and tomatoes were developed from the Schlesinger method. Folpet was determined in the cleaned up extract by GLC with an ECD. The recovery of folpet from various fortified commodities was commonly 70-100%, but with some excursions outside this range. In a total of 340 tests the mean and median recoveries were 87% and 86% respectively. The LOD was 0.05 mg/kg.

Folpet residues were shown to be stable during freezer storage for the intervals tested in apple juice (30 days), wet apple pomace (35 days), apples (149 days), cranberries (176 days), cucumbers (29 days), grape juice (36 days), lettuce (90 days), onions (41 days), tomato paste (30 days), tomato purée (31 days) and tomatoes (136 days).

Information was made available to the Meeting on registered uses of folpet and on supervised trials on apples, grapes, strawberries, onions, cucumbers, melons, tomatoes and lettuce. Relevant data evaluated in 1993 and 1994 were also reviewed where possible.

Folpet is registered in Argentina for use on apples with 3 applications of 3.6 kg ai/ha and harvest 10 days after the final application. Folpet residues in apples from 2 trials according to GAP were 1.4 and 2.6 mg/kg.

Canadian GAP permits folpet to be applied 8 times to apples at 0.8 kg ai/ha with harvest 7 days after the final application. In 4 trials where the use pattern corresponded to GAP the residues were 0.43, 0.65, 1.1 and 1.4 mg/kg.

Folpet residues from 2 trials on apples in Chile where the trial conditions corresponded to the registered use (2.0 kg ai/ha, 3 applications, 7 days PHI) were 2.0 and 3.7 mg/kg.

In a Hungarian trial which complied with GAP (8 applications of 1.6 kg ai/ha and a PHI of 10 days), a Swiss trial according to GAP (4 applications of 2.0 kg ai/ha and a PHI of 21 days), and a Spanish trial complying with GAP (10 applications of 1.9 kg ai/ha and a PHI of 10 days), the folpet residues were 8.0, 3.4, and 3.1 mg/kg respectively.

Folpet may be applied 8 times at 1.6 kg ai/ha to apples in Portugal with harvest 21 days after the final application. In a trial meeting these conditions the residue was 3.2 mg/kg. In a trial reported

in 1993 folpet was applied 10 times at 1.3 kg ai/ha, which is within the acceptable range for evaluation, and the resulting residue after 21 days was 1.8 mg/kg

In France folpet may be used up to 11 times on apples at 1.0-1.2 kg ai/ha with harvest 14 days later. In 4 trials in France complying with GAP the residues were 0.9, 1.4, 1.4 and 1.8 mg/kg.

In summary, the folpet residues in apples from trials according to GAP were 1.4 and 2.6 mg/kg in Argentina, 0.43, 0.65, 1.1 and 1.4 mg/kg in Canada, 2.0 and 3.7 mg/kg in Chile, 8.0 mg/kg in Hungary, 3.4 mg/kg in Switzerland, 3.1 mg/kg in Spain, 1.8 and 3.2 mg/kg in Portugal, and 0.9, 1.4, 1.4 and 1.8 mg/kg in France. The residues in rank order (median underlined) in the 17 trials were 0.43, 0.65, 0.9, 1.1, 1.4, 1.4, 1.4, 1.4, 1.8, 1.8, 2.0, 2.6, 3.1, 3.2, 3.4, 3.7 and 8.0 mg/kg.

The Meeting estimated a maximum residue level and an STMR of 10 mg/kg and 1.8 mg/kg respectively for apples.

The folpet residue in grapes was 1.6 mg/kg in a supervised trial that complied with GAP in Argentina (4 applications of 1.0 kg ai/ha and a PHI of 7 days). The residues were 2.6 and 3.0 mg/kg in 2 supervised trials in Chile according to GAP (2.0 kg ai/ha, 3 applications and 14 days PHI), and below the LOD, <0.05 mg/kg, in a Mexican trial in accordance with GAP (1.0 kg ai/ha, 7 applications and a PHI of 10 days).

Italian GAP permits 5 applications of folpet to grapes at 1.6 kg ai/ha with harvest 10 days after the final application. In an Italian trial according to GAP in 1996 and 2 Italian trials reported in 1993 where folpet was used 7 and 10 times at 1.5 kg ai/ha with a PHI of 10 days the folpet residues were 3.3, 0.58 and 0.75 mg/kg.

Four French trials (2 reported in 1993) were evaluated in terms of Italian GAP. The application rates were 1.5 and 1.6 kg ai/ha, with 7 and 8 applications and PHIs of 8 and 10 days, conditions which were acceptably close to GAP. The residues were 1.3, 2.2, 3.7 and 8.1 mg/kg.

In summary, folpet residues in grapes from trials according to GAP were 1.6 mg/kg in Argentina, 2.6 and 3.0 mg/kg in Chile, <0.05 mg/kg in Mexico, and 0.58, 0.75, 1.3, 2.2, 3.3, 3.7 an and 8.1 mg/kg in Italy and France. The residues in rank order (median underlined) in the 11 trials were <0.05, 0.58, 0.75, 1.3, 1.6, 2.2, 2.6, 3.0, 3.3, 3.7 and 8.1 mg/kg.

The Meeting estimated maximum residue and STMR levels for grapes of 10 mg/kg and 2.2 mg/kg respectively.

GAP in Mexico permits 4 applications of folpet to strawberries at 1.3 kg ai/ha with harvest 2 days after the final application, and in The Netherlands 2 applications of 1.4 kg ai/ha and a 14-day PHI. The residues in 3 Mexican and 3 Dutch trials complying with GAP were 1.6, 1.7 and 2.2 mg/kg, and 1.4, 1.6 and 1.9 mg/kg respectively.

The Meeting noted that the results of these 6 trials were in line with the current draft MRL for strawberries of 5 mg/kg, and decided that it would be preferable to estimate an STMR when all the information on residue trials and current GAP become available for the periodic review in 1998.

GAP for onions in Chile allows 3 applications of 2 kg ai/ha and in Mexico 4 applications at 1.5 kg ai/ha, both with harvest 7 days after the final application. Folpet residues in one Chilean and two 2 Mexican trials complying with GAP were 0.36, 0.41 and 0.41 mg/kg.

Two trials in Greece and four in Hungary according to national GAP gave residues of <0.05 (3), 0.07 and 0.21 mg/kg.

The folpet residues in onions in trials in Portugal (5.0 mg/kg) and Spain (2.5 mg/kg) were somewhat higher than in other European countries (<0.05-0.21 mg/kg), and probably related to the drip irrigation system used in Portugal and Spain, whereas sprinkler irrigation is used elsewhere.

In the trials in Greece, Hungary, Portugal and Spain the field sample was described as at least 2 kg consisting of 12 or more onions. The soil was removed mechanically by hand and the whole plant, including roots and foliage, was analysed. The Meeting was informed that this sampling procedure was based on a draft EU guideline, which is unfortunately in conflict with a long-established Codex procedure. Because the correct sample for bulb onions does not include roots or foliage the Meeting could not use the data, and the 3 trials in Chile and Mexico were insufficient to estimate a maximum residue level.

The folpet residue in cucumbers was 0.07 mg/kg in a Canadian trial according to Canadian GAP (8 applications of 1.0 kg ai/ha with a PHI of 7 days), and 0.11, 0.36, 0.56 and 0.70 mg/kg in four Mexican trials complying with national GAP (1.8 kg ai/ha with harvest after the last of 4 applications).

The Meeting noted that the current draft MRL for cucumbers is 0.5 mg/kg and concluded that it would be preferable to evaluate all the residues in terms of relevant GAP at the periodic review in 1998.

In Greece folpet is registered for use on melons at 0.49 kg ai/ha with harvest 20 days after the final application (maximum 4). Folpet residues were below the LOD (<0.05 mg/kg) in melons in 4 Greek trials according to GAP and in 2 others where folpet was applied at twice the GAP rate.

Mexican GAP permits 6 applications at 1.8 kg ai/ha and harvest 7 days after the final application. The residues in 3 Mexican trials complying with GAP were 0.40, 0.89 and 2.2 mg/kg.

In two trials in Honduras according to GAP (4 applications of 0.64 kg ai/ha and a PHI of 3 days), the residues were 0.32 and 0.41 mg/kg, and in a Guatemalan trial according to GAP (6 applications of 0.48 kg ai/ha and a PHI of 3 days), the residue was 0.23 mg/kg.

In summary, folpet residues in melons from trials effectively according to GAP were <0.05 (6) in Greece, 0.40, 0.89 and 2.2 mg/kg in Mexico, 0.32 and 0.41 mg/kg in Honduras and 0.23 mg/kg in Guatemala. The residues in rank order in the 12 trials were <0.05 (6), 0.23, 0.32, 0.40, 0.41, 0.89 and 2.2 mg/kg.

As the residues in the Greek trials appear to belong to a different population from the others, the 6 trials in Mexico, Honduras and Guatemala were used to estimate an STMR.

The Meeting estimated maximum residue and STMR levels for folpet in melons of 3 mg/kg and 0.41 mg/kg respectively. The STMR in this case is for the whole melon because data were not available on residues in the edible portion.

GAP for tomatoes in Chile allows 7 applications of 1.7 kg ai/ha with a 7-day PHI, and in Mexico 5 applications at 2.0 kg ai/ha with a 2-day PHI. Folpet residues in one Chilean and 5 Mexican trials complying with GAP were 2.4 mg/kg and 0.45, 1.0, 1.3, 1.6 and 1.8 mg/kg respectively.

In Hungary folpet is registered for use on tomatoes at an application rate of 0.65 kg ai/ha with harvest 14 days after the final application (maximum of 3). In 4 Hungarian trials according to GAP and in 1 trial reported in 1993 with 5 applications at the GAP rate and PHI the residues were all below the LOD (<0.02 and <0.05 (4) mg/kg).

In one Italian and two Portuguese trials in compliance with Portuguese GAP (4 applications of 1.3 kg ai/ha and 7 days PHI) the residues were 0.34, 0.55 and 0.58 mg/kg. In a Spanish trial according to GAP (6 applications of 1.6 kg ai/ha and a 10-day PHI) the residue was 1.3 mg/kg.

In summary, folpet residues in tomatoes from trials according to GAP were 2.4 mg/kg in Chile, 0.45, 1.0, 1.3, 1.6 and 1.8 mg/kg in Mexico, <0.02 and <0.05 (4) mg/kg in Hungary, 0.55, 0.34 and 0.58 mg/kg in Portugal and Italy, and 1.3 mg/kg in Spain. The residues in rank order in the 15 trials were <0.02, <0.05 (4), 0.34, 0.45, 0.55, 0.58, 1.0, 1.3 (2), 1.6, 1.8 and 2.4 mg/kg.

The residues in the Hungarian trials appear to be in a different population from the others. The 10 trials from Chile, Portugal, Italy and Spain were used to estimate an STMR.

The Meeting estimated maximum residue and STMR levels for folpet in tomatoes of 3 mg/kg and 1.15 mg/kg respectively.

Folpet is registered in Mexico for 4 applications of 1.3 kg ai/ha to lettuce with harvest 7 days after the final application. Folpet residues were 4.5, 9.8 and 16 mg/kg in 3 Mexican trials on head lettuce with 5 applications at the GAP rate and PHI, and 22 mg/kg in one trial on leaf lettuce under the same conditions.

Folpet residues were not detected (<0.05 mg/kg) in head or leaf lettuce in 2 trials in Greece according to Greek GAP (4 applications of 0.61 kg ai/ha and 20 days PHI), except that only 3 applications were made to head lettuce. No residue was detected (<0.05 mg/kg) in leaf lettuce in a Spanish trial according to GAP (4 applications of 0.78 kg ai/ha and 21 days PHI).

In summary, folpet residues in head lettuce were 4.5, 9.8 and 16 mg/kg in Mexico and <0.05 mg/kg in Greece, and in leaf lettuce 22 mg/kg in Mexico, <0.05 mg/kg in Greece and <0.05 mg/kg in Spain. The data populations in Mexico and Europe appear to be different. There were too few results to make a recommendation.

Processing

Field-treated apples were processed to juice and wet pomace to simulate commercial practice as closely as possible. The process included an initial washing step which removed about 40% of the residue. The processing factors for the production of wet pomace and apple juice were 2.6 and 0.035 respectively.

The STMR-Ps for the processed apple commodities calculated from the processing factors and the STMR for apples (1.8 mg/kg) are wet apple pomace 4.7 mg/kg and apple juice 0.063 mg/kg.

Grapes were treated post-harvest by dipping bunches for 30 seconds in a vat containing folpet (1.25 kg ai/hl). The grapes were allowed to dry and then processed into raisins and juice. Because folpet is a surface residue it was considered valid to treat grapes in this way.

The treated grapes were dried in the sun until the moisture level reached 12-16%. After destemming, the dried grapes were rehydrated to 18-20% moisture in an incubator at 21°C to produce raisins. Juice was produced from treated grapes by crushing, enzyme treatment, heating and filtering.

Folpet residues were not detectable (<0.05 mg/kg) in the grape juice. The calculated processing factor for juice is <0.003. Folpet residues in the dried and hydrated raisins were higher than in the original grapes, with processing factors of 3.2 and 1.9 respectively.

The Meeting estimated a maximum residue level for folpet residues in dried grapes or raisins of 40 mg/kg after rounding up, from the processing factor of 3.2 and the maximum residue level estimated for grapes (10 mg/kg).

The STMR-P levels calculated from the processing factors and the STMR for grapes (2.2 mg/kg) are grape juice 0.0066 mg/kg, dried raisins 7.0 mg/kg, and hydrated raisins 4.2 mg/kg.

In 10 trials on grapes in Germany in 1993 residues of folpet were measured in the must and wine produced from treated grapes. The processing factors for folpet transfer from grapes to must ranged from 0 to 0.97, mean 0.29. Folpet was not detected (<0.05 mg/kg) in any wine sample, hence the processing factor for wine is 0. Phthalimide, a metabolite and breakdown product of folpet, was consistently present in both must and wine.

The STMR-P for must calculated from the mean processing factor and the STMR for grapes (2.2 mg/kg) is 0.64 mg/kg.

The Meeting noted that the use of folpet on grapes consistently results in phthalimide residues in wine at levels typically 25-50% of the folpet levels in the grapes. The metabolism study on grapes had shown the formation of a water-soluble conjugate of phthalic acid in grapes which also has the potential to reach the wine.

A tomato crop was treated 5 times with folpet at 2.2 kg ai/ha and harvested 7 days after the final application for processing. The tomatoes were treated in 0.5% sodium hydroxide and then vigorously washed before being processed to juice, purée and paste. Purée was produced from juice by evaporation, adjustment of salt and water levels, heating and canning. Paste was produced similarly, but with a higher salt level.

Folpet residues were not detected (<0.05 mg/kg) in tomato purée or paste produced from tomatoes containing 1.8 mg/kg of folpet. It is quite likely that the initial vigorous cleaning of the tomatoes would remove or destroy most of the folpet residues. The calculated processing factor for the transfer of folpet from tomatoes to purée and paste is <0.028, and the STMR-P calculated from the STMR for tomatoes of 1.15 mg/kg is 0.032 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.

Definition of the residue (for compliance with MRL and for estimation of dietary intake): folpet.

Commodity		Recommended MRL, mg/kg		Based on PHI, days	STMR, mg/kg	STMR-P, mg/kg
CCN	Name	New	Previous			
FP 0226	Apple	10	-	7-21	1.8	
DF 0269	Dried grapes (currants, raisins and sultanas)	40				7.0
FB 0269	Grapes	10	2	7-14	2.2	
VC 0046	Melons, except Watermelon	3	-	3-7	0.41	
VO 0448	Tomato	3	-	2-10	1.15	
	Apple juice					0.063
	Apple pomace, wet					4.7
	Grape juice					0.0066

Commodity		Recommended MRL, mg/kg		Based on PHI, days	STMR, mg/kg	STMR-P, mg/kg
CCN	Name	New	Previous			
	Must					0.64
	Raisins, hydrated					4.2
	Tomato paste					0.032
	Tomato purée					0.032
	Wine					0

REFERENCES

Abdelrahim, K.A. 1996. Processing of grapes for collection of samples for residue analysis for processing phase of magnitude of residues of folpet in/on grape juice and raisins from grapes treated with Folpan 50. Study AA960307. American Agricultural Services, Inc. Project PG8137. National Food Laboratory, Inc. USA. Unpublished.

Armstrong, T.F. and Luke, J.E. 1995. Magnitude of folpet residues in apples, a processing study. Field test SARS-95-NY-50P. ACDS number 95402. ACDS Research, Inc, USA. Unpublished.

Balluff, M. 1995. Gaining of samples for the determination of residues of folpet in strawberries under field conditions at one location in Italy. Report 95046/I1-FFST. Trial 95I005R. GAB Biotechnologie GmbH & IFU Umweltanalytik GmbH, Germany. Study IT 218/95. Makhteshim code R-8989. Unpublished.

Cheng, H. M. 1980. [Carbonyl-^{14}C] Folpet metabolism in tomato plants. File no. 721.14/Phaltan. Chevron Chemical Company, USA. Unpublished.

Cowlyn, T. C. 1996. Validation of the analytical method for the determination of residues of the fungicide folpet on apples, melons, onions, lettuce, tomatoes and strawberries. Report 96/MAK387/1137, Huntingdon Life Sciences Ltd, UK. Unpublished.

Crowe, A. 1995. Folpet: distribution and metabolism in winter wheat. Report 95/MAK204/0049. Pharmaco LSR Ltd, UK. Unpublished.

Cugier, J-P. 1992. Situation résidu en viticulture (Bilan de trois années d'enquête), , Laboratoire GRAPPA, Sous la direction de la DGAL-SDPV, Makhteshim code R-7815. Ministère de L'Agriculture de la Pêche et de l'Alimentation, France. Unpublished.

De Paoli, M and Bruno, R. 1995a. Determination of folpet residues in tomato samples. Report ERSA-DA-12/95. Ref IT 217/95. Ente Regionale Promozione e Sviluppo Agricoltura, Italy. Makhteshim code R-8987. Unpublished.

De Paoli, M. and Bruno, R. 1995b. Determination of folpet residues in strawberry samples. Study ERSA-DA-06/95. Ref IT 218/95 and 95046/I1-FFST. Ente Regionale Promozione e Sviluppo Agricoltura, Italy. Unpublished.

De Paoli, M. and Bruno, R. 1995c. Determination of folpet residues in strawberry samples. Study ERSA-DA-10/95. Trial IT 219/95. Ente Regionale Promozione e Sviluppo Agricoltura, Italy. Unpublished.

Farthing, L. 1996a. Analytical report. Magnitude of the residue of folpet in/on tomato raw agricultural commodities. AASI study AA950311. EN-CAS project 95-0069. EN-CAS Analytical Laboratories, Inc. Unpublished.

Farthing, L. 1996b. Analytical report. Magnitude of the residue of folpet in/on cucumber raw agricultural commodities. AASI study AA950312. EN-CAS project 95-0065. EN-CAS Analytical Laboratories, Inc. Unpublished.

Farthing, L. 1996c. Analytical report. Magnitude of the residue of folpet in/on apples raw agricultural commodities. AASI study AA950314. EN-CAS project 95-0064. EN-CAS Analytical Laboratories, Inc. Unpublished.

Farthing, L. 1996d. Analytical report. Magnitude of the residue of folpet in/on grape juice and raisins from grapes treated with Folpan 50WP. AASI study AA960307. EN-CAS project 95-0100. EN-CAS Analytical Laboratories, Inc. Unpublished.

Farthing, L. 1997a. Analytical report. Magnitude of the residue of folpet in/on dry bulb onion raw agricultural commodities. AASI study AA950307. EN-CAS project 95-0070. EN-CAS Analytical Laboratories, Inc. Unpublished.

Farthing, L. 1997b. Analytical report. Magnitude of the residue of folpet in/on grapes raw agricultural commodities. AASI study AA950313. EN-CAS project 95-0071. EN-CAS Analytical Laboratories, Inc. Unpublished.

Fuchsbichler, G. 1994. Analysis of residues on folpet and its metabolite phthalimide in grapes, must and wine in 1993. Report 1 (3) HVA 7/94. Bayerische Hauglversuchsanstalt für Landwirtschaft Abteilung Rückstandsanalytik, Germany. Unpublished.

Grinbaum, M. 1994. Résumé de la synthèse des travaux réalises sur le folpel par l'Unité Expérimentale de l'I.T.V. Orange. Makhteshim code R-7194. ITV Experimental Unit, Orange, France. Unpublished.

Grolleau, G. 1996. Magnitude of the residue of folpet in grape raw agricultural commodity. Project R 5051. Anadiag. Study EA950170. European Agricultural Services. Makhteshim code R-9146F. Unpublished.

Hurley, K. and Farthing, L. 1996a. Analytical report. Magnitude of the residue of folpet in/on lettuce raw agricultural commodities. AASI study AA950309. EN-CAS project 95-0066. EN-CAS Analytical Laboratories, Inc. Unpublished.

Hurley, K. and Farthing, L. 1996b. Analytical report. Magnitude of the residue of folpet in/on strawberry raw agricultural commodities. AASI study AA950310. EN-CAS project 95-0068. EN-CAS Analytical Laboratories, Inc. Unpublished.

Hurley, K. and Farthing, L. 1996c. Analytical report. Magnitude of the residue of folpet in/on melons raw agricultural commodities. AASI study AA950308. EN-CAS project 95-0067. EN-CAS Analytical Laboratories, Inc. Unpublished.

Hurley, K. and Farthing, L. 1996d. Analytical report. Magnitude of the residue of folpet in tomatoes, a processing study. SARS study SARS-95-51. EN-CAS project 95-0060. EN-CAS Analytical Laboratories, Inc. Unpublished.

Hurley, K. and Farthing, L. 1996e. Analytical report. Magnitude of the residue of folpet in apples, a processing study. SARS study SARS-95-50. EN-CAS project 95-0059. EN-CAS Analytical Laboratories, Inc. Unpublished.

Ipach, R. 1994a. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 80 WP in roten Trauben, Most und Rotwein. Study UHL09. SLFA, Germany. Unpublished.

Ipach, R. 1994b. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 80 WP in Weißen Trauben, Most und weißwein. Study UHL10. SLFA, Germany. Unpublished.

Ipach, R. 1994c. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 WDG in Weißen Trauben, Most und weißwein. Study UHL11. SLFA, Germany. Unpublished.

Ipach, R. 1994d. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 WDG in Weißen Trauben, Most und weißwein. Study UHL12. SLFA, Germany. Unpublished.

Ipach, R. 1994e. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 SC in roten Trauben, Most und Rotwein. Study UHL15. SLFA, Germany. Unpublished.

Ipach, R. 1994f. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 SC in Weißen Trauben, Most und weißwein. Study UHL16. SLFA, Germany. Unpublished.

Leppert, B.C. 1996a. Magnitude of folpet residues in apples, a processing study. Project 95-0059. Report SARS 95-50. Stewart Agricultural Research Services Inc., USA. Unpublished.

Leppert, B.C. 1996b. Magnitude of folpet residues in tomatoes, a processing study. Makhteshim code R-9101. Project 95-0060. Report SARS 95-51 Stewart Agricultural Research Services Inc., USA. Unpublished.

Lipps, H. P. 1994a. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 80 WP in Weißen Trauben, Most und weißwein. Study UHL08. SLFA, Germany. Unpublished.

Lipps, H. P. 1994b. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 SC in Weißen Trauben, Most und weißwein. Study UHL14. SLFA, Germany. Unpublished.

Mader, H. 1994a. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 80 WP in weissen Trauben, Most und Weisswein. Study UHL07. SLFA, Germany. Unpublished.

Mader, H. 1994b. Feld- und Verabeitungsstudie zur Bestimmung der Rückstandswerte von Folpan 500 SC in weissen Trauben, Most und Weisswein. Study UHL13. SLFA, Germany. Unpublished.

Mester, T.C. 1994a. Nature of the residue study LX1145-05 [(^{14}C)-folpet] on grapes in California. Landis trial 1714-92-145-05-03B-01. Research for Hire trial R329201. Landis International, Inc. Unpublished.

Mester, T.C. 1994b. Nature of the residue study (^{14}C)-folpet LX1145-05 in avocados applied under field conditions. Landis trial 1714-92-145-05-32D-02. Research for Hire trial R329308. Landis International, Inc. Unpublished.

Nishioka, L.T., Rose, J.E. and Ruzo, L.O. 1996. A method for the determination of folpet residues in avocados and other oily crops. Report 568W-1. Project 568W. PTRL West, Inc., USA. Unpublished.

O'Connor, J. 1994. Folpet: Nature of residue on grapes. Report 93/WLS019/0962. Pharmaco LSR, UK. Makhteshim code R-6403a. Unpublished

Perny, A. 1996. Folpet - magnitude of the residues in grapes raw agricultural commodity. Project R 5051. Anadiag. Unpublished.

Schlesinger, H.M. 1991. A method for the determination of folpan and phthalimide residues in non-oily crops. Project FP/15/91. Analyst Research Laboratories, Israel. Unpublished.

Singer, G.M. 1996a. Magnitude of the residue of folpet in/on melon raw agricultural commodities. Study AA950308. American Agricultural Services, Inc., USA. Project 95-0067. EN-CAS Analytical Laboratories, Inc. Makhteshim code R-9141M. Unpublished.

Singer, G.M. 1996b. Magnitude of the residue of folpet in/on strawberry raw agricultural commodities. Study AA950310. American Agricultural Services, Inc., USA. Project 95-0068. EN-CAS Analytical Laboratories, Inc. Makhteshim code R-9141s. Unpublished.

Singer, G.M. 1996c. Magnitude of the residue of folpet in/on dry- and wet-sampled cranberry raw agricultural commodities. Study AA950306. American Agricultural Services, Inc., USA. Project 95-0035. EN-CAS Analytical Laboratories, Inc. Unpublished.

Singer, G.M. 1997a. Magnitude of the residue of folpet in/on dry bulb onions raw agricultural commodities. Study AA950307. American Agricultural Services, Inc., USA. Project 95-0070. EN-CAS Analytical Laboratories, Inc. Unpublished.

Singer, G.M. 1997b. Magnitude of the residue of folpet in/on lettuce raw agricultural commodities. Study AA950309. American Agricultural Services, Inc., USA. Project 95-0066. EN-CAS Analytical Laboratories, Inc. Unpublished.

Singer, G.M. 1997c. Magnitude of the residue of folpet in/on tomatoes raw agricultural commodities. Study AA950311. American Agricultural Services, Inc., USA. Project 95-0069. EN-CAS Analytical Laboratories, Inc. Makhteshim code R-9141t. Unpublished.

Singer, G.M. 1997d. Magnitude of the residue of folpet in/on cucumber raw agricultural commodities. Study AA950312. American Agricultural Services, Inc., USA. Project 95-0065. EN-CAS Analytical Laboratories, Inc. Makhteshim code R-9141c Unpublished.

Singer, G.M. 1997e. Magnitude of the residue of folpet in/on grapes raw agricultural commodities. Study AA950313. American Agricultural Services, Inc., USA. Project 95-0071. EN-CAS Analytical Laboratories, Inc. Makhteshim code R-9141g. Unpublished.

Singer, G.M. 1997f. Magnitude of the residue of folpet in/on apples raw agricultural commodities. Study AA950314, American Agricultural Services Inc. Project 95-0064, EN-CAS Analytical Laboratories, Inc., USA. Unpublished

Singer, G.M. 1997g. Magnitude of the residue of folpet in grapes, juice and raisins from grapes treated with Folpan 50WP. Study AA960307, American Agricultural Services Inc. Project 95-0100, EN-CAS Analytical Laboratories, Inc., USA. Unpublished.

Toia, R.F., and Collins, E.H. 1994. Nature of the residue (^{14}C)-folpet (LX1145-05) in avocados applied under field conditions. Landis trial 1714-92-145-05-32D-02. PTRL project 417W. RFH project R32908. PRRL report 417W-2. PTRL West, Inc., USA. Unpublished.

Wasser, C. 1996. Folpet - determination of the residues in grapes, must and wine after treatment with Folpan SC or Folpan 80 WDG. Makhteshim code R-8411. Report. R 5011. Anadiag S.A. Unpublished.

Wasser, C. 1997. Folpet - determination of the residues in grapes, must, wine and spirit. Validation of the method ITV-FO 05/89. Report R 5015. Anadiag S.A. Unpublished.

Williams, M. 1996. Independent laboratory confirmation of analytical methods for the determination of folpet in plant tissues. Report 10146. Horizon Laboratories Inc. USA. Makhteshim code R-9008. Unpublished.

Wilson, A.J. 1997a. Raw agricultural commodity study with folpet applied to greenhouse strawberries in Holland. Report 96/MAK372/1159. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9161. Unpublished.

Wilson, A.J. 1997b. Raw agricultural commodity study with folpet applied to lettuces in Greece, Spain and Portugal. Report 96/MAK378/1182. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9160. Unpublished.

Wilson, A.J. 1997c. Raw agricultural commodity study with folpet applied to apples in Hungary, Switzerland, Spain, Portugal and France. Report 96/MAK374/1214. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9162. Unpublished.

Wilson, A.J. 1997d. Raw agricultural commodity study with folpet applied to tomatoes in Hungary, Spain and Portugal. Report 96/MAK375/1215. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9158. Unpublished.

Wilson, A.J. 1997e. Raw agricultural commodity study with folpet applied to melons in Greece. Report 96/MAK373/0975. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9159. Unpublished.

Wilson, A.J. 1997f. Raw agricultural commodity study with folpet applied to onions in Greece, Spain and Portugal. Report 96/MAK377/1246. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9163. Unpublished.

Wilson, A.J. 1997g. Raw agricultural commodity study with folpet applied to protected lettuces in Hungary. Report MAK378/97032. Huntingdon Life Sciences Ltd, UK. Makhteshim code R-9160. Unpublished. the

Cross-index of report numbers, study numbers and references

Reports and studies are listed in alphanumerical order, and each is linked to a reference.