FOLPET (041)

EXPLANATION

Folpet was first evaluated in 1969 and has been reviewed several times since, most recently in 1993, 1994 and 1997 for residues. It was listed by the 1997 CCPR (29th Session, ALINORM 97/24A, Appendix III) for Periodic Review by the 1998 JMPR. Data was provided by the main manufacturer. and by the governments of Germany and The Netherlands.

Extensive information was reviewed by the 1997 JMPR, but is now also included in the present evaluation within the CCPR Periodic Review Programme.

IDENTITY

ISO common name: folpet

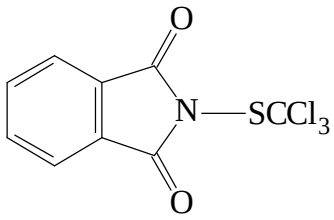
Chemical name
IUPAC: *N*-(trichloromethylthio)phthalimide
CAS: 2-[(trichloromethyl)thio]-1*H*-isoindole-1,3(2*H*)-dione

CAS No: [133-07-03]

CIPAC No: 75

Synonyms, trade names: Folpan, Folpet, Folpel, Phaltan

Structural formula:



Molecular formula: $C_9H_4Cl_3NO_2S$

Molecular weight 296.6

Physical state: amorphous powder

Formulations: SC, WP, WDG

Physical and chemical properties

Pure active ingredient

Melting point: 179-180°C (decomposition)

Henry's Law constant: 7.9×10^{-3} Pa. M^3/mole

Stability:	Stable in the dry state. Slowly hydrolysed by moisture at room temperature. Rapidly hydrolysed in concentrated alkalis and at elevated temperatures.
Vapour pressure	2.1×10^{-5} Pa (25°C)
Octanol/water partition coefficient:	1279 (25ºC)
Solubility	Water solubility: 0.59-0.80 mg/l at 25°C, 0.50 mg/l at 15°C (Schlesinger, 1987).
Specific gravity	1.72 g/cm^3
Hydrolysis (Weizman, 1985)	pH 4, half life 6.5 hours (25°), 1.06 hours (40°C) pH 7, half-life 0.70 hours (25°C), 10.7 minutes (40°C) pH 9, (25°C) too fast to measure with the standard methodology.
Photolysis	Stable under UV light or sunlight conditions

Technical material

Purity	minimum 92%. Not less than 880 g/kg (FAO specifications).
Specifications	FAO Specifications (FAO, 1988)

Formulations

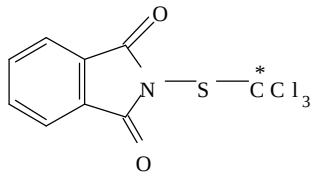
Folpet is available as a wettable powder, suspension concentrate (flowable) and water dispersible granules.

METABOLISM AND ENVIRONMENTAL FATE

Animal metabolism

Information on the metabolism of folpet in a lactating goat was reported.

Tissues, milk, excreta and expired air residues were measured in a miniature lactating goat (22 kg bw) dosed orally by capsule for 3 consecutive days with [*trichloromethyl*-^{14}C]folpet at a rate equivalent to 20 ppm in the feed or a daily dose of 0.55 mg/kg bw (Corden, 1997a). The goat was housed in an enclosed metabolism chamber to allow collection of expired air, urine and faeces.



Folpet - position of label

The goat was milked twice daily. Approximately 23 hours after the final dose the goat was slaughtered and air was drawn through the metabolism chamber into potassium hydroxide traps to collect the expired CO_2.

Most of the radiolabel was rapidly excreted (Table 1). The liver (0.5% of total dose) accounted for most of the radiolabel in the tissues (0.8% of total dose) and contained the highest tissue residue (Table 2). Levels of ^{14}C in the milk had reached a plateau by 48 hours.

Table 1. Distribution of ^{14}C in the excreta, expired air, tissues and milk from a goat dosed with [*trichloromethyl*-^{14}C]folpet at a rate equivalent to 20 ppm in the feed for 3 days (Corden, 1997a).

Sample	^{14}C as % of total dose
Urine	10.2
Faeces	41.9
Expired air	31.4
Intestinal tract	16.9
Cage wash	0.2
Tissues	0.8
Milk	1.0
TOTAL	116.4%

Table 2. Residues of ^{14}C in the tissues and milk (expressed as folpet equivalents) from a goat dosed with [*trichloromethyl*-^{14}C]folpet equivalent to 20 ppm in the feed for 3 days (Corden, 1997a).

Sample	^{14}C as folpet mg/kg
Fat, subcutaneous	0.01
Fat, peritoneal	0.01
Muscle, fore-leg	0.03
Muscle, rump	0.04
Kidney	0.26
Liver	0.34
Milk, day 1	0.23
Milk, day 2	0.38
Milk, day 3	0.34

In another trial, residues in the tissues, milk and excreta of 2 lactating goats (60 and 50 kg bw) dosed orally for 6 consecutive days by capsule with [*trichloromethyl*-^{14}C]folpet or *[benzene*-^{14}C]folpet at a rate equivalent to 24 and 14 ppm respectively in the feed or with daily doses of 0.37 and 0.34 mg/kg bw (Corden, 1997b). The goats were again housed in metabolism chambers and milked twice daily. Approximately 23 hours after the final doses the goats were slaughtered.

From the goat dosed with *[benzene*-^{14}C]folpet 58% of the ^{14}C was excreted in the urine and 35% in the faeces. The label in the tissues and milk accounted for <0.1% of the total dose and its levels were higher in the kidneys and liver than in the other tissues (Table 3).

Thiazolidine was the main metabolite identified in the urine from the [*trichloromethyl*-^{14}C]folpet dosed goat and phthalamic acid and phthalimide the main metabolites in the urine and faeces from the *[benzene*-^{14}C]folpet dosed goat.

Table 3. Residues of folpet equivalents in the tissues and milk from a goat dosed with *[benzene*-^{14}C]folpet equivalent to 24 ppm in the feed for 6 days (Corden, 1997b).

Tissue and milk	^{14}C as folpet mg/kg
Fat, subcutaneous	0.004
Fat, peritoneal	<0.001
Muscle, fore-leg	0.003
Muscle, rump	0.003
Kidney	0.052

Tissue and milk	^{14}C as folpet mg/kg
Liver	0.022
Milk, day 1	0.004
Milk, day 2	0.006
Milk, day 3	0.005
Milk, day 4	0.005
Milk, day 5	0.005
Milk, day 6	0.006

^{14}C was incorporated into amino acids, cholesterol, phosphatidylcholine, choline chloride, glucose and other unknown components in the liver, kidneys and muscle of the [*trichloromethyl*-^{14}C]folpet dosed goat. In milk ^{14}C was incorporated into lactose and amino acids.

Phthalimide, phthalic acid and phthalamic acid were identified in the tissues and milk of the *[benzene*-^{14}C]folpet dosed goat (Table 4).

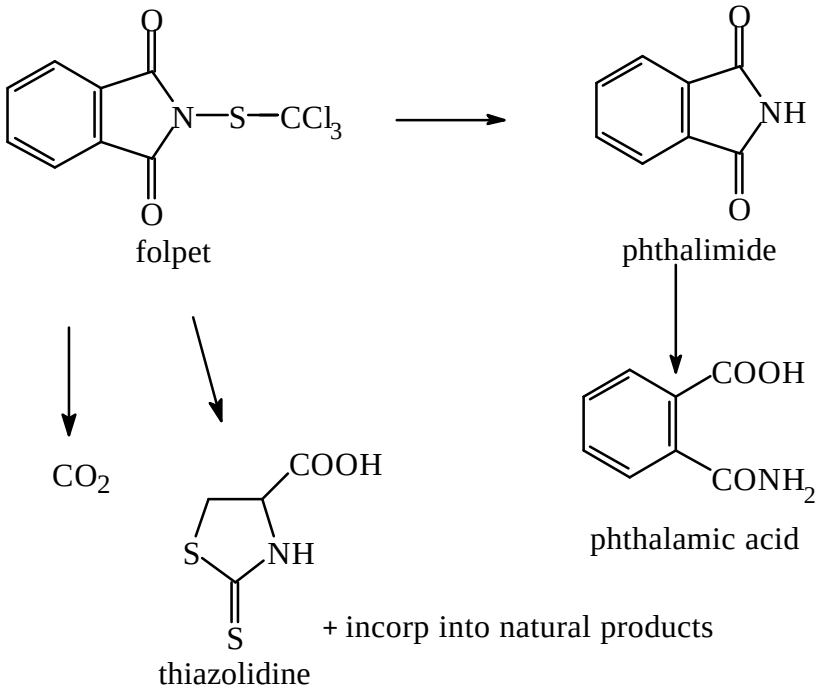
Table 4. Metabolites identified in the tissues and milk of a goat dosed with *[benzene*-^{14}C]folpet equivalent to 24 ppm in the feed for 6 days (Corden, 1997b).

Metabolite	Concentration, as folpet equivalents, mg/kg		
	liver	kidney	milk
Phthalamic acid	0.006	0.013	
Phthalimide	0.001	0.001	<0.001
Phthalic acid + phthalamic acid + phthalimide[1]		0.023	<0.001
TOTAL ^{14}C	0.022	0.052	0.006

[1] Components unresolved

Folpet is rapidly degraded in the goat, initially by loss of the -CCl_3. The carbon from the -CCl_3 becomes incorporated into thiazolidine and natural products. The benzene end of the molecule was metabolized to phthalimide and phthalamic acid. The proposed metabolic pathways in goats are shown in Figure 1.

Figure 1. Proposed metabolic pathways in goats.



Plant metabolism

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

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

Methanol/water extracts of the roots and tops were analysed by TLC. One day after treatment about 85% of the ^{14}C in the nutrient solution had been absorbed into the plants and about 60% of the absorbed ^{14}C translocated to the tops. By the 11th day 93% had been absorbed from the nutrient solution and 90% of the ^{14}C in the plant was in the tops. The parent compound was a minor part of the residue in the plant.

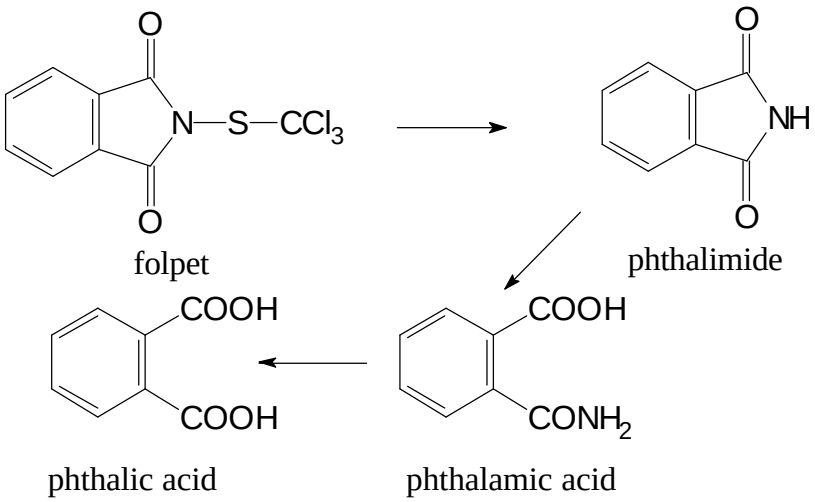
Table 5. Residues in tomato plants after exposure through the roots to a nutrient solution containing [*carbonyl*-^{14}C]folpet (Cheng (1980).

Compound	Compound as % of extractable ^{14}C in roots and tops							
	day 1		day 4		day 7		day11	
	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 TLC Rf values of phthalic acid and phthalamic acid were too close to be separated, but about 90% of the ^{14}C was estimated to be phthalamic acid from an autoradiogram.

Figure 2. Metabolism of folpet 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. The ages of the plants at the two treatments, maturity and harvest were 190, 214, 258 and 269 days respectively.

Levels of ^{14}C were lower in the roots than the straw or grain at each sampling. Plant parts were not washed before measurements were made, so surface residues are included. Recovery of the ^{14}C in the extracts and the residue was high, particularly for straw and grain. Levels of ^{14}C were higher in the final stages of the crop because the plant had begun to dry out. The composition of the extractable residue is shown in Table 6.

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

The extracted straw from day 269 was treated with 1M HCl to release bound residues; phthalic acid (1 mg/kg) was released.

Table 6. 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 at 1-month intervals of [*benzene*-^{14}C]folpet to Thomson Seedless grape vines, equivalent to 1.5 kg ai/ha for each application, and harvested grapes and leaves 25 days after the final application. O'Connor (1994) conducted the laboratory part of the study. 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-soluble and water-soluble. The disposition of the radiolabel is shown in Table 7.

Table 7. Distribution of radiolabel in rinsing and extraction fractions from grapes and leaves of grape 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	Grape		Leaf	
	^{14}C as % of total in grapes	^{14}C as folpet, mg/kg	^{14}C as % of total in leaves	^{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 residue	1.5%	0.11	1.1%	3.2
TOTAL	100%	7.6	100%	294

The identities of the components in the rinses and extracts are shown in Table 8. Folpet itself constituted 27% of the residue 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. HPLC showed that the material was very polar; on a reversed phase system it eluted with the solvent front. Attempts to identify the material by MS and various combinations of HPLC-MS were not successful. Acid hydrolysis yielded phthalic acid. The material was therefore identified as phthalic acid conjugates. Phthalamic acid was not considered as a possible metabolite in this study.

Table 8. Residues on grapes and leaves of grape vines treated with 3×1.5 kg ai/ha [*benzene*-^{14}C]folpet harvested 25 days after the final application (O'Connor, 1994).

Compound	Grapes Residue expressed as folpet, mg/kg			Leaves Residue 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) made 3 foliar applications at 21-day intervals of [*benzene*-^{14}C]folpet to a small avocado tree in California, equivalent to 3.4 kg ai/ha for each application, and harvested fruit and leaves 21 and 97 days after the final application. Fruit were immature at 21 and mature at 97 days.

Toia and Collins (1994) conducted the laboratory part of the study. Aqueous rinsing released surface residues; samples were then thoroughly extracted with ethyl acetate. The distribution of

radiolabel in the fruit and leaf is shown in Table 9. The identities of the components in the rinses and extracts were examined by TLC and HPLC and are shown in Table 10.

Table 9. Distribution of radiolabel in rinses and extracts from 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		Leaf	
	21 days after treatment	97 days after treatment	21 days after treatment	97 days after treatment
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 10. Components of the residue on avocado fruit and leaves from a tree treated with 3×3.4 kg ai/ha [*benzene*-^{14}C]folpet harvested 21 and 97 days after the final application (Toia and Collins, 1994).

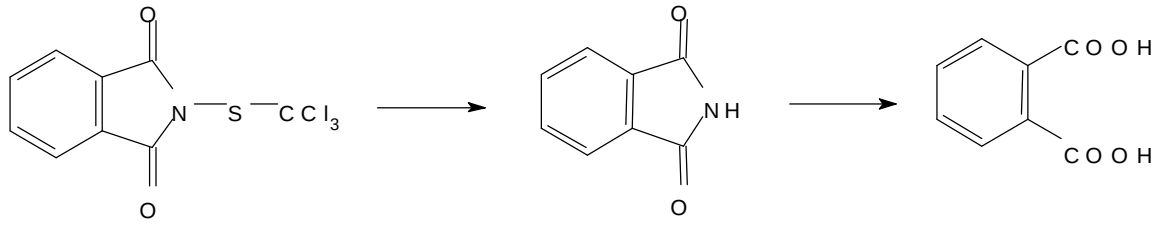
Compound	Residue expressed as folpet, mg/kg				
	Fruit			Leaf	
	21-day		97-day	21-day	
	rinse	extract	extract	rinse	extract
Folpet	0.29	0.25	0.026	24	54
Phthalimide	0.20	0.55	0.22	10.4	1.2
Phthalic acid	0.077	7.2	4.5	4.0	11
Polar materials	0.018	0.52	0.40	0.94	8.6
Others		0.59	0.34		0.78

Phthalic acid was the main component of the residue in the fruit, particularly in extracts. The extracts of the peel and pulp from 97-day fruit were examined separately; phthalic acid constituted 85% and 65% 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 mainly a surface residue. In the fruit harvested 21 days after the final application folpet accounted for 47% of the ^{14}C in the rinse, but only 2.7% of the ^{14}C extracted from the fruit. In the fruit harvested after 97 days the residue in the rinse was too low to identify individual components, but in the extracts of the mature fruit 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 used in the supervised trials on apples, lettuce, melons, onions, strawberries and tomatoes, and summarized the validation data; the methods were developed from the Schlesinger method. Folpet was determined in the cleaned up extract by GLC with an ECD. The Schlesinger method, originally numbered FP/15/91, has been reissued as FP/15/93.

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 imply 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

Analytical recoveries of folpet by methods based on that of Schlesinger (1991), were obtained for various commodities during method validation and analysis of samples from supervised trials. The commodities tested were apple, apple juice, wet apple pomace, cranberry, cucumber, grape juice, grapes, lettuce, melons, must, onion, raisins, grape spirit, strawberry, tomato, tomato paste, tomato purée and wine. Recoveries were determined from 0.05 mg/kg up to 5 mg/kg for most substrates, and up to 20 or 50 mg/kg for some, and were found to be quantitative down to a level of 0.05 mg/kg, which is the limit of determination (LOD). Recoveries did not appear to depend on residue level or substrate. Over the 340 recovery tests the mean and median were 87% and 86% respectively.

De Paoli and Bruno (1995a, method MR 52) extracted tomatoes with dichloromethane and cleaned up the extract by passage through a chromatography cartridge. Folpet residues in the extract were measured by GLC with an ECD after the addition of ethion as an internal standard. Recoveries were 94-110% at 0.05 mg/kg (n = 3) and 97-106% at 0.20 mg/kg (n = 3). The LOD was 0.05 mg/kg. De Paoli and Bruno (1995b) also used method MR 52 for strawberry analysis. Recoveries were 72-80% at 0.10 mg/kg (n = 3) and 94-101% at 0.50 mg/kg (n = 3).

Grinbaum (1994) analysed grape samples for folpet and phthalimide after extracting the grapes with acetone and cleaning up the extract by solvent partition and column chromatography

(method FO 05/89). The folpet residues were measured by GLC with an ECD and the phthalimide by GLC with an NPD. Quantitative recoveries of both analytes were obtained at a level of 0.1 mg/kg and above. In 13 recovery tests on folpet at fortification levels of 0.10 to 3.0 mg/kg the mean recovery was 91% (range 75-114%). In 9 tests on phthalimide at fortification levels of 0.070 to 1.0 mg/kg the mean recovery 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 were robust enough to be successfully and reproducibly used by competent chemists without outside assistance and with no prior experience of the method.

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 folpet degradation during gas chromatography; which had varied between runs and with different crop extracts. Additional clean-up was needed to produce a clean extract from onions. Satisfactory recoveries and repeatability were achieved with the modified Schlesinger method for folpet residues in apples, cantaloupe, cranberries, cucumbers, grapes, lettuce, onions, strawberries and tomatoes. Folpet residues in avocados were successfully analysed by the Nishioka method with some extra clean-up.

Turner and Partridge (1996) analysed cereal grains and straw for folpet residues by an HPLC method, achieving an LOD of 0.05 mg/kg. Folpet residues were extracted with ethyl acetate which was washed with aqueous phosphoric acid. Further clean-up was effected by gel permeation chromatography. Residues were determined on a reversed phase column using an acetonitrile-water mobile phase.

Folpet is included in Multi-residue Method 1, Pesticides amenable to gas chromatography (The Netherlands, 1996). LODs for various matrices were 0.01-0.05 mg/kg.

Stability of pesticide residues in stored analytical samples

Information was made available to the Meeting on the freezer storage stability of folpet residues in apple juice, wet apple pomace, apples, cranberries, cucumbers, grape juice, lettuce, onions, potatoes, tomato paste, tomato purée, tomatoes , wheat grain and wheat straw. Storage stability data are shown in Table 11.

Table 11. Freezer storage stability of folpet in various substrates fortified at 1 mg/kg. Most raw commodities were stored whole, but cereals were chopped. Recoveries were calculated from the analytical results at day 0 and after storage, neither of which were corrected for analytical recoveries.

Sample	Storage temp	Folpet added, mg/kg	Duration, days	%, folpet remaining	Reference
Apple juice	-12 to -27°C	1.0	7 14 30	106 77 77	95-0059
Apple pomace, wet	-12 to -27°C	1.0	16 35	99 90	95-0059
Apple, whole	-12 to -27°C	1.0	14 30 149	105 98 111	95-0059
Cranberries	-12 to -27°C	1.0	14 29 144 176	81 90 109 83	AA950306
Cucumber	below -10°C	1.0	16 29	78 98	95-0065

Sample	Storage temp	Folpet added, mg/kg	Duration, days	%, folpet remaining	Reference
Grape juice	below -12°C	1.0	7 14 29 36	111 116 108 105	95-0100
Lettuce	-10 to -27°C	1.0	14 30 90	101 96 100	95-0066
Onions	-12 to -27°C	1.0	14 41	106 93	95-0070
Potato, whole	below -10°C	1.0	20 34 55	103 96 119	95-0101 AA960303
Tomato paste	below -10°C	1.0	14 30	89 99	95-0060
Tomato purée	below -10°C	1.0	14 31	91 89	95-0060
Tomatoes, whole	below -10°C	1.0	13 35 74 136	92 93 91 80	95-0060
Wheat grain, chopped and blended.	frozen -26°C	1.0	91 182 366	102 92 95	OA00382 R9156
Wheat straw, chopped and blended.	frozen -26°C	1.0	91 182 366	75 91 92	OA00382 R9156

Triplicate samples of raisins (hydrated) from the processing trials (95-0100) were analysed for folpet stored below -12°C for 21 days and then analysed again. Folpet residues had decreased by an average of 6%.

The temperature of storage of the wheat grain and straw was not stated.

Folpet was stable in freezer storage for the periods tested, but some periods did not exceed 30 days.

Definition of the residue

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

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

USE PATTERN

Folpet is a broad-spectrum, non-systemic fungicide used on food and other crops. The major uses are against diseases of grapes, pome and stone fruit and vegetables. Information was provided on registered uses around the world. Labels were provided for uses in many countries. Those not supported by a label are indicated by a footnote.

Table 12. Registered uses of folpet.

Crop	Country	Form	Application	PHI, days

			Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number	
Almonds	Spain	WP	foliar		0.13-0.15		10
Apples	Argentina	WP	foliar		0.12		15
Apples	Canada	WP	foliar		0.075-0.10		1
Apples	Chile	WP	foliar	1.5-2.0	0.09-0.11		3
Apples	France (north) 1/	SC	foliar	1.04	0.10-0.14	11	14
Apples	France (south) 1/	SC	foliar	0.98-1.2	0.081-0.12	9	14
Apples	Hungary	WP	foliar	1.5			10
Apples	Mexico	WP	foliar	1.0-1.3			
Apples	Portugal	WP	foliar		0.13		21
Apples	Spain	WP	foliar		0.13-0.15		10
Apples	Switzerland	WG	foliar		0.08		21
Avocado	Mexico	WP	foliar	1.0-1.3			
Barley, winter	France, north 1/	SC	foliar	1.8	0.58	2	36-56
Barley, winter	France, south 1/	SC	foliar	1.8	0.44	2	40-49
Blueberries	Canada	WP	foliar		0.10		1
Celery	Argentina	WP	foliar		0.13		7
Celery	Canada	WP	foliar		0.10		7
Celery	Costa Rica	WP	foliar	0.10-0.13	0.10-0.13		7
Celery	El Salvador	WP	foliar	0.10-0.13	0.10-0.13		7
Celery	Honduras	WP	foliar	0.10-0.13	0.10-0.13		7
Celery	Mexico	WP	foliar	1.0-2.0			no limit
Cherries	Argentina	WP	foliar		0.12		7
Cherries, sour	Canada	WP	foliar		0.10		1
Chickpeas	Spain	WP	foliar		0.13-0.15		10
Citrus fruits	Mexico	WP	foliar	1.0-1.5			
Cranberries	Canada	WP	foliar		0.50		30
Cucumbers	Argentina	WP	foliar		0.12		7
Cucumbers	Canada	WP	foliar		0.10-0.20		1
Cucumbers	Mexico	WP	foliar	1.3-1.8			no limit
Currants	Canada	WP	foliar		0.20		7
Egg plant	Spain	WP	foliar		0.13-0.15		10
Endive	Spain	WP	foliar		0.13-0.15		21
Garlic	Argentina	WP	foliar		0.12-0.13		7
Garlic	Chile	WP	foliar	1.5-2.0	0.10-0.13		7
Garlic	Mexico	WP	foliar	1.0-1.5			no limit
Gooseberries	Canada	WP	foliar		0.20		7
Grapes	Canada	WP	foliar		0.10		1
Grapes	Chile	WP	foliar	1.5-2.0	0.10-0.15		3
Grapes	France 2/	SC	foliar	1.0-1.5			21, 30
Grapes	France 2/	WG	foliar	1.0-1.5			21, 28
Grapes	France 2/	WP	foliar	1.0-1.8			28
Grapes	Mexico	WP	foliar	1.0			no limit
Grapes	Spain	WP	foliar		0.15-0.20		21
Grapes, table	Argentina	WP	foliar		0.10-0.13		7
Grapes, table	Italy	WP	foliar		0.16		10
Grapes, wine	Argentina	WP	foliar		0.10-0.13		20
Grapes, wine	Germany 1/	SC	foliar	0.45-1.2	0.075	8	[1]
Grapes, wine	Germany 1/	SC	foliar	0.6-1.6	0.1	6	[2]
Grapes, wine	Italy	WP	foliar		0.16		40
Green beans	Spain	WP	foliar		0.13-0.15		21
Leek	Spain	WP	foliar		0.13-0.15		10
Lettuce	Greece	SC	foliar		0.13-0.16		
Lettuce	Mexico	WP	foliar	1.3			no limit
Lettuce	Portugal	WP	foliar		0.10-0.13		14

[1] Up to stage 61 and stages 68-81.

[2] Up to stage 81.

Crop	Country	Form	Application				PHI, days
			Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number	
Lettuce	Spain	WP	foliar		0.13-0.15		21
Melons	Argentina	WP	foliar		0.12		7
Melons	Canada	WP	foliar		0.10-0.20		1
Melons	Costa Rica	WP	foliar	0.10-0.13	0.10-0.13		7
Melons	El Salvador	WP	foliar	0.10-0.13	0.10-0.13		7
Melons	Greece	SC	foliar		0.13-0.16		20
Melons	Honduras	WP	foliar	0.10-0.13	0.10-0.13		7
Melons	Mexico	WP	foliar	1.3-1.8			no limit
Olives	Spain	WP	foliar		0.13-0.15		10
Onions	Argentina	WP	foliar		0.12-0.13		7
Onions	Chile	WP	foliar	1.5-2.0	0.10-0.13		7
Onions	Costa Rica	WP	foliar	0.10-0.13	0.10-0.13		7
Onions	El Salvador	WP	foliar	0.10-0.13	0.10-0.13		7
Onions	Greece	SC	foliar		0.13-0.16		
Onions	Honduras	WP	foliar	0.10-0.13	0.10-0.13		7
Onions	Hungary	WP	foliar		0.10-0.13		5
Onions	Mexico	WP	foliar	1.3-1.5			no limit
Onions	Portugal	WP	foliar		0.10-0.13		7
Peach	Argentina	WP	foliar		0.12		7
Pears	Argentina	WP	foliar		0.12		15
Pears	Chile	WP	foliar	1.5-2.0	0.09-0.11		3
Peas	Spain	WP	foliar		0.13-0.15		10
Peppers	Argentina	WP	foliar		0.13		7
Potato	Argentina	WP	foliar		0.12-0.18		7
Potato	Chile	WP	foliar	1.0-1.7	0.10-0.15		7
Potato	Spain	WP	foliar		0.13-0.15		10
Pumpkins	Canada	WP	foliar		0.10-0.20		1
Squash	Canada	WP	foliar		0.10-0.20		1
Stone fruit	Spain	WP	foliar		0.13-0.15		10
Strawberries	Argentina	WP	foliar		0.13		7
Strawberries	Canada	WP	foliar		0.10		1
Strawberries	Chile	WP	foliar	1.5-2.0	0.10-0.15		7
Strawberries	Costa Rica	WP	foliar	0.10	0.10		7
Strawberries	El Salvador	WP	foliar	0.10	0.10		7
Strawberries	Honduras	WP	foliar	0.10	0.10		7
Strawberries	Mexico	WP	foliar	0.75-1.3			no limit
Strawberries	Netherlands	WP	field		0.13		4
Strawberries	Netherlands	WP	glasshouse		0.13		14
Strawberries	Spain	WP	foliar		0.13-0.15		21
Summer squash	Mexico	WP	foliar	1.3-1.8			no limit
Tomato	Argentina	WP	foliar		0.13-0.14		7
Tomato	Canada	WP	foliar		0.20		1
Tomato	Chile	WP	foliar	1.0-1.7	0.10-0.15		7
Tomato	Costa Rica	WP	foliar	0.13	0.13		7
Tomato	El Salvador	WP	foliar	0.13	0.13		7
Tomato	Honduras	WP	foliar	0.13	0.13		7
Tomato	Hungary	WP	foliar		0.10-0.13		14
Tomato	Mexico	WP	foliar	1.5-2.0			no limit
Tomato	Portugal	WP	foliar		0.13		7
Tomato	Spain	WP	foliar		0.13-0.15		10
Watermelon	Argentina	WP	foliar		0.12		7
Watermelon	Costa Rica	WP	foliar	0.10-0.13	0.10-0.13		7
Watermelon	El Salvador	WP	foliar	0.10-0.13	0.10-0.13		7
Watermelon	Honduras	WP	foliar	0.10-0.13	0.10-0.13		7
Watermelon	Mexico	WP	foliar	1.3-1.8			no limit
Wheat, winter	France, north 1/	SC	foliar	1.8	0.58	2	25-51

Crop	Country	Form	Application				PHI, days
			Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number	
Wheat, winter	France, south 1/	SC	foliar	1.8	0.44	2	19-49
Wheat, winter	Germany 1/	SC	foliar	0.8	0.25	2	35
Wheat, winter	UK 1/	WG	foliar	1.6	0.8	2	39-45

1/ No label available.
2/ In some formulations, folpet is mixed with another fungicide which may influence the PHI.

RESIDUES RESULTING FROM SUPERVISED TRIALS

Residues from supervised residue trials on fruit and vegetables are shown in Tables 13-23.

Table 13	*Apples.* Argentina, Canada, Chile, France, Germany, Hungary, Poland, Portugal, Spain, Switzerland, USA.
Table 14	*Grapes*. Argentina, Chile, France, Germany, Italy, Mexico, Russia.
Table 15	*Strawberry*. Italy, Mexico, The Netherlands.
Table 16	*Onion.* Chile, Germany, Greece, Hungary, Mexico, The Netherlands, Portugal, Spain.
Table 17	*Cucumber*. Canada, Mexico. *Melons.* Greece, Guatemala, Honduras, Mexico.
Table 18	*Tomato.* Chile, Hungary, Italy, Mexico, The Netherlands, Portugal, Spain, USA.
Table 19	*Head lettuce*. Greece, Hungary, Mexico, Portugal. *Leaf lettuce*. Greece, Mexico, Spain. *Lamb's lettuce*. Germany
Table 20	*Potato.* Italy, Mexico, Poland, Russia, South Africa.
Table 21	*Barley, wheat.* France, Germany, UK.
Table 22	*Cereal fodder.* France, Germany, UK.
Table 23	*Cereal forage.* France, Germany, UK.

Where residues were not detected, results are recorded as below 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 trials included control plots, no control data are recorded in the tables except where residues in control samples exceeded the LOD. Residues are recorded uncorrected for recoveries where possible. Results were corrected for recovery in some trials on onions, potatoes, strawberries and tomatoes and the reports did not include uncorrected data. In some trials it was not clear whether or not the results were corrected.

Trials were mainly fully reported as well as on summary sheets except German trials on apples and lamb's lettuce, some French trials on cereals and apples, and potato trials in Poland.

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. In Table 13 analyses of replicate field samples from one plot or from duplicate plots in the same trial are shown separately.

No field report was available for the apple trial in Poland so it was not evaluated.

Supervised apple trials took place at 4 sites in Canada, 2 in Argentina and 2 in Chile where folpet was applied with a motorised pump backpack sprayer or an airblast sprayer driven by a power take-off (Table 13). 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 by 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 samples (3 kg) of grapes were harvested from each plot 0-21 days after the final application, and extracted within 3 days of receipt at the laboratory. 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.

In 6 further grape trials in France in 1996 folpet was applied by atomiser sprayer 8 times with samples (1.1-3.6 kg) taken for analysis 3 and 4 weeks after the final application. Plot sizes were 49-93 m^2.

Folpet was applied by boom sprayer in the strawberry trials in Italy in 1995. 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 decreased the residues. In trial R-8986 rain (total ~80 mm) occurred on 9 successive days immediately after the final application. The results for trial R-8986 are corrected for recovery, but recoveries were in the range 84-108%, so the adjustments are small. In the Italian trials in 1996 data are also corrected for recovery. Strawberries sampled on the day of the last application were very small (300 fruit in 1 kg) and the results may not represent a commercial situation.

Strawberries were produced in plastic tunnels in the trials in The Netherlands in 1996. Three field samples (1 kg each) were analysed from each plot; there were 2 plots in each trial at the label rate and 1 plot in trials at twice the 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. Procedural recoveries were 52-53% from strawberries from trial AA950310.01, but despite investigations no clear reason was discovered. The recorded results are 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 the 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 treated plots in each trial at the label rate and single plots in each of two Hungarian trials at twice the label rate. One field sample (at least 2 kg, 12 or more onions) per plot was analysed. The soil was removed by hand and the whole plant was analysed.

A compressed air sprayer was used to apply folpet in the onion trials (plot size, 7.5 m of row) in The Netherlands in 1996. Field samples were 2 kg or 12 bulbs. Results were corrected for recovery in the German trial on onions but not in The Netherlands trials.

In cucumber trials in Mexico and Canada folpet was applied with a motorized backpack sprayer (Mexico) or a CO_2 pressurized backpack sprayer (Canada). Plot areas ranged from 90 to 280 m^2, each trial consisting of a treated plot and a control plot. Field samples from the treated plot were 2kg. Folpet was applied with a backpack boom sprayer to melons in trials in Greece. Two field samples, each of 12 melons about 15 cm diameter, were taken from each plot (90-180 $m^{2)}$. Trials at the label rate were with 2 treated plots and a control plot. Duplicate field samples from each trial were analysed; the residue reported in Table 17 is the mean with the individual analyses in brackets. whole melons were analysed.

Melons were treated with folpet 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 per trial. Each field sample consisted of 12 melons and duplicate field samples were analysed from each plot.

Plot sizes were 10 and 40 m^2 in the Italian tomato trials in 1995. Folpet was applied as a high-volume spray by knapsack or by compressed air sprayer. Field samples comprised 24 tomatoes. The plot size was 50-60 m^2 in the Italian tomato trials in 1996 where folpet was applied by gas pressured knapsack. Field samples were 2.5-4 kg (24-32 fruit).The 1995 and 1996 results 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 spray was applied with a lance to staked tomatoes. There were 2 treated plots in each trial at the label rate and 1 treated plot in the trials at twice the label rate. 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 precise dates were not recorded. Residue levels could be reduced if irrigation occurred while 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 each treated plot (1 per trial).

Folpet was applied by motor sprayer to the tomatoes in The Netherlands greenhouse trials in 1995, the plot size was 72 m^2 and field samples were 2.5 kg. Samples were stored for 490 days before analysis in trial R9118.

Folpet was applied by backpack CO_2 boom sprayer to lettuce in trials in Greece, Portugal and Spain. In the two trials in Greece and the one in Spain the lettuce were irrigated by overhead sprinkler 1 or 2 days after the final application and in each of these trials 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 quite likely that the use of 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 1997-97. Plot size was 50 m^2. The field sample from each plot constituted 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. Lettuce heads (12 per field sample) were cut and the outermost, trash leaves were removed in the field. Duplicate field samples from each trial were analysed.

Folpet was applied by boom sprayers and precision sprayers to plots of 54-62 m^2 in potato trials in Italy in 1995-96. Field samples were 24 tubers (2-4 kg). Results were corrected for

recoveries. In some trials sampled tubers were gently brushed to remove soil. In trials R8988 and R9094 no clear description of sample cleaning was provided.

Plot size was 200 m^2 in the Mexican trials on potatoes where folpet was applied with back pack motorized sprayers. On field sampling, the dirt was brushed off each potato using a paint brush and the potatoes were patted dry with a clean paper towel.

Field reports were not available for the potato trials in Poland and Russia. Folpet was applied by hand sprayer in Poland and tractor sprayer and knapsack in Russia. A TLC method was used for residue analysis in the Russian trials.

Folpet was applied with a CO_2 knapsack boom sprayer in the South African trials on potatoes in 1995. No field or analytical report was provided.

The Meeting received information on a series of wheat and barley trials in France and the UK from 1992 to 1996. Field reports were not included for the French trials nor for the UK wheat trials R8559-5 and R8559-6. In the UK trials on wheat in 1995 (trials R8580-1 and R8580-2) folpet was applied to plots of 48 and 144 m^2. Minimum sample sizes were 1 kg grain and 0.5 kg straw.

Table 13. Folpet residues in apples resulting from supervised trials in Argentina, Canada, Chile, France, Germany, Hungary, Poland, Portugal, Spain, Switzerland and the USA. Analyses on 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.

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

Country, year (variety)	Application				PHI, days	Folpet residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Germany, 1985 (Gloster)	WP +SC	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)	WP +SC	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)	WP +SC	10×0.75 +0.5	10×0.075 +0.2	10 11	24 3	0.32 0.43	BBA 85/Ob/12885
Hungary, 1996 (Star King)	WP	1.6	0.10	8	10	5.4, 4.4, 5.1 6.5, 5.9, 8.0	MAK374-01 R-9162
Poland 1996 (Elstar)	WG	3.6		3	1 7 14 21	7.4 8.0 4.4 4.7 4.2 4.5 2.9 3.3	R9852
Portugal, 1996 (Jonagold Red)	WP	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)	WP	3.1	0.26	8	21	5.5, 10.8, 9.9	MAK/374-05 R-9162
Spain, 1996 (Red Mornet)	WP	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)	WP	3.7	0.31	6	10	6.9, 4.1, 3.0	MAK/374-04 R-9162
Switzerland, 1996 (Fiorina)	WG	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)	WP	2.9	0.31	4	7	2.1 note[1] 1.2 fw 5.4 wp 0.072 j	SARS-95-50 95-0059

Table 14. Folpet, and phthalimide residues in grapes resulting from supervised trials in Argentina, Chile, France, Germany, Italy, Mexico and Russia. Analyses of replicate field samples from one plot are shown separately. Double-underlined residues are from treatments according to GAP and were used to estimate 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

[1] fw: whole fruit washed. wp: wet pomace. j: juice.

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
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 c 0.066	0.50, 0.31, 0.94, 1.4 c 0.070	R-7194a
					15	1.8, 4.3, 1.3, 2.0 c 0.098	0.94, 0.91, 0.52, 0.91 c 0.11	
					30	0.76, 1.1, 0.42, 0.22 c 0.057	0.48, 0.53, 0.31, 0.28 c 0.056	
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
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
France N 1996 (Chardonnay)	WG	4×1.9 +1×2.0 +2×1.9 +1×2.0	0.57-0.76	8	21 28	5.8 4.8		R9098 R6149 BKA/628/96/RES
France N 1996 (Chardonnay)	SC	1.9	0.55-0.78	8	21 28	2.6 3.5		R9098 R6149 BKA/628/96/RES
France N 1996 (Chardonnay)	SC	6×1.5 +1×1.6 1×1.4	0.57-0.63	8	21 28	1.9 1.7		R9098 R6149 BKA/628/96/RES
France S 1996 (Cinsault R110)	WG	2×1.6 +1×2.0 +1×1.7 +1×2.1 +3×1.9	0.64-0.84	8	21 28	4.6 2.7		R9098 R6149 BKA/628/96/RES

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
France S 1996 (Cinsault R110)	SC	2×1.7 +2×1.9 +1×1.7 +1×1.9 +1×1.8 +1×1.9	0.49-0.76	8	21 29	5.7 3.8		R9098 R6149 BKA/628/96/RES
France S 1996 (Cinsault R110)	SC	1.3 +1×1.5 +1×1.6 +1×1.5 +1×1.4 +1×1.6 +2×1.5	0.54-0.65	8	21 28	5.9 1.5		R9098 R6149 BKA/628/96/RES
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
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

Country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
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
Russia 1995 (Rkaziteli)	WG	1.0	0.10	4	0 10 20 30 40	6.0 0.05 <0.02 <0.02 <0.02		R9572
Russia 1995 (Rkaziteli)	WP	1.0	0.10	4	0 10 20 30 40	3.5 <0.02 <0.02 <0.02 <0.02		R9572

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

Table 15. Folpet residues in strawberries resulting from supervised trials in Italy, Mexico and The Netherlands. Analyses of replicate field samples from one plot and 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.

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	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
Italy, 1996 (Addie)	WP	0.73-0.76	0.13	2 3	17 0 7 14 21	0.07 0.66 0.14 0.04 0.04	R9093 96009/I1-FFST ERSA-DA-05/96
Italy, 1996 (Marmolada WB)	WP	0.75	0.13	2 3	7 0 7 14 21	0.29 0.52 0.19 0.12 0.09	R9383 6077PI1 96IT32 ERSA-DA-15/96

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
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
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
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
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
Netherlands, 1996 (Elsanta)	WP	1.3+1.4	0.13	2 pt[1]	14	1.3, 0.7, 1.2 1.0, 1.1, 1.9	R-9161 MAK/372-01

Table 16. Folpet residues in bulb onions resulting from supervised trials in Chile, Hungary, Germany, Greece, Mexico, The Netherlands, Portugal and Spain. 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. Samples from European trials include roots and foliage.

Country, year (variety)	Application				PHI, days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	
Chile, 1996 (Grano de oro)	WP	2.0	0.13	3	7	0.36, 0.27	R-9140 AA950307.03 95-0070
Germany 1996 (Elody) [DJH1]	SC	1.0	0.25	3	0 7 14 21	5.2 4.8 1.4 1.2	R9496 96222/01-RFON
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

[1] pt:, plastic tunnel

Country, year (variety)	Application				PHI, days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	
Mexico, 1995 (Suprema)	WP	1.5	3×0.37 +0.56	4	7	0.41, 0.32	R-9141 AA950307.02 95-0070
Netherlands 1996 (Hyfield)	SC	0.91-0.98	0.30-0.33	2 3	7 0 7 14 21	0.17 0.51 <0.02 0.03 <0.02	R9234 MAH 96145 96020/N1-RPO
Netherlands 1996 (Hysam)	SC	0.89	0.30	2 3	7 0 7 14 21	0.24 0.60 0.02 0.02 0.02	R9234 MAH 96145 96020/N1-RPO
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 17. Folpet residues in cucumbers and melons resulting from supervised trials in Canada, Greece, Guatemala, Honduras and Mexico. Analyses of replicate field samples from one plot are shown separately. Double-underlined residues are from treatments according to GAP and were used to estimate maximum residue levels.

CUCURBITS, country,	Application				PHI,	Folpet residues,	Ref
year (variety)	Form	kg ai/ha	kg ai/hl	no.	days	mg/kg	
CUCUMBERS							
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

CUCURBITS, country, year (variety)	Application				PHI, days	Folpet residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.			
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 18. Folpet residues in tomatoes resulting from supervised trials in Chile, Hungary, Italy, Mexico, The Netherlands, Portugal, Spain and the USA. 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.

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Chile, 1996 (Conservo)	WP	1.7	1.5	7	7	1.4, <u>2.4</u>	R-9141t AA950311.06 95-0069
Hungary, 1996 (Kecskemet 407)	WP	0.65	0.13	3	14	<<u>0.05</u>, <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	<<u>0.05</u>, <0.05	R-9158 MAK/375.02
Hungary, 1996 (Prima)	WP	0.65	0.13	3	14	<<u>0.05</u>, <0.05	R-9158 MAK/375.04
Hungary, 1996 (Rio Fiego)	WP	2×0.65 +0.66	0.13	3	14	<<u>0.05</u>, <0.05	R-9158 MAK/375.03
Italy 1995 (Marmande)	WP	1.2	0.13	4	0 7 10 14	1.1 0.62 <u>0.43</u> 0.28	R9099 95046/I1-FFTO ERSA-DA-11/95
Italy 1995 (Rita)	WP	pg 1.2	0.13	4	0 7 10 14 21	1.5 0.38 0.40 0.42 0.50	R9320 95046/I1-FGTO ERSA-DA-01/96
Italy 1995 (Rita)	SC	pg 1.8	0.18	4	0 7 10 14 21	1.1 0.53 0.48 0.39 0.33	R9320 95046/I1-FGTO ERSA-DA-01/96
Italy 1996 (Monica)	WP	pg 1.3	0.13	3 4	8 0 3 7 10 14	0.58 0.57 0.64 0.75 0.59 0.77	R9086 96009/I1-FGTO ERSA-DA-19/96

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Italy 1996 (Monica)	SC	pg 1.4	0.14	3 4	8 0 3 7 10 14	0.58 0.56 0.65 0.83 0.72 0.79	R9086 96009/I1-FGTO ERSA-DA-19/96
Italy 1996 (Red Setter)	WP	1.3	0.13	3 4	9 0 7 10 14	1.0 1.3 0.83 0.62 0.80	R9095 96009/I1-FFTO ERSA-DA-08/96
Italy 1996 (San Marzano)	WP	1.3	0.13	3 4	8 0 7 10 14	0.57 0.94 0.96 0.70 0.42	R9095 96009/I1-FFTO ERSA-DA-14/96
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
Netherlands 1995 (Trust)	SC	g 1.8	0.12	2 3	7 0 2 4 7	0.77 0.96 0.98 0.88 0.75	R9118 96020/N1-RPT F95-21-NL-05
Netherlands 1995 (Trust) [DJH2]	SC	g 1.8	0.12	2 3	7 0 2 4 7	0.68 0.79 0.52 0.66 0.55	R9118 96020/N1-RPT F95-21-NL-05
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

pg: plastic greenhouse. g: glasshouse.

Table 19. 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. 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.

LETTUCE, country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	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[1] (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

[1] wl: with wrapper leaves. xwl: without wrapper leaves.

LETTUCE, country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
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
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

Table 20. Folpet residues in potatoes resulting from supervised trials in Italy, Mexico, Poland, Russia and South Africa. 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.

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Italy 1995 (Liseta)	WP	1.3	0.13	4	0 7 10 14	<0.01 <0.01 <u>0.08</u> <0.01	R8988 ERSA-DA-07/95
Italy 1996 (Agata)	WP	1.2	0.13	2 3	8 0 7 10 14	0.04 0.05 <0.01 <u><0.01</u> <0.01	R9094 ERSA-DA-06/96 96009/I1-FFPO
Italy 1996 (Arinta)	WP	1.3	0.13	4	0 7 10 14	0.03 <0.01 <u><0.01</u> <0.01	R9374 95046/I1-FFPO ERSA-DA-02/96
Italy 1996 (Draga)	WP	1.3	0.13	2 3	8 0 7 10 14	<0.01 <0.01 <0.01 <u><0.01</u> <0.01	R9261 ERSA-DA-16/96 6076AB1
Mexico (Mexico State) 1996 (Alpha)	WP	2.4	0.45-0.48	5	30	0.01 <0.01	R9012 AA960303 95-0101
Mexico (Mexico State) 1996 (Alpha)	WP	4.5-5.2	0.90-0.96	5	30	0.01 <0.01	R9012 AA960303 95-0101
Mexico (Nuevo Leon) 1996 (Alpha)	WP	2.3-2.5	0.59-0.61	5	30	<0.01 (2)	R9012 AA960303 95-0101
Mexico (Nuevo Leon) 1996 (Alpha)	WP	4.8	1.2	5	30	<0.01 (2)	R9012 AA960303 95-0101

Country, year (variety)	Application				PHI, days	Residues, mg/kg folpet	Ref
	Form	kg ai/ha	kg ai/hl	no.			
Poland 1996 (Frezja)	WG	1.6		3	15 21	<0.01 <0.01	R9711
Russia 1996 (Detskoselkski)	WP	1.5	0.5	3	0 4 8 10 12	<0.1 <0.1 <0.1 <0.1 <0.1	R9772
Russia 1996 (Rezerv)	WP	1.5	0.38	3	0 10 20 31 40	<0.04 <0.04 <0.04 <0.04 <0.04	R9790
Russia 1996 (Rezerv)	WG	1.5	0.38	3	0 10 20 31 40	<0.04 <0.04 <0.04 <0.04 <0.04	R9790
Russia 1996 (Volzhanin)	WP	1.5	0.38	3	0 4 8 10 12	<0.1 <0.1 <0.1 <0.1 <0.1	R9772
South Africa 1995 (Sandvelder)	SC	1.0	0.2	7	15 22 44	<0.05 (2) <0.05 (2) <0.05 (2)	R9057 ZA-16-D 1095
South Africa 1995 (Sandvelder)	SC	2.0	0.4	7	15 22 44	<0.05 (2) <0.05 (2) <0.05 (2)	R9057

Table 21. Folpet residues in cereal grains resulting from supervised trials in France, Germany and UK. Analyses of replicate field samples from one plot or from duplicate plots in one trial are shown separately.

CEREALS, country, year (variety)	Application				PHI, days	Residues, mg/kg		Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	phthalimide	
BARLEY, WINTER								
France N 1992 (Alpha)	SC	1.8	0.58	2	53	0.087		R7150 RF2095
France N[1] 1992 (Reinette)	SC	1.8	0.58	2	52	0.19		R7150 RF2095
France N 1992 (Plaisant)	SC	1.8	0.58	2	47	0.75		R7150 RF2095
France N 1992 (Plaisant)	SC	1.8	0.58	2	47	0.63		R7150 RF2095
France N 1993 (Pastoral)	WG	1.8	0.59	2	56	0.021 0.024	<0.02 (2)	R7795[DJH3] RF4019
France S[2] 1993 (Plaisant)	WG	1.8	0.44	2	49	0.12 0.089	<0.02 (2)	R7795 R4019
France S 1993 (Volga)	WG	1.8	0.44	2	40	<0.02 (2)	<0.02 (2)	R7795 R4019
France N 1993 (Pastoral)	SC	1.8	0.58	2	56	0.23 <0.02	<0.02 (2)	R7795 R4019
France S 1993 (Plaisant)	SC	1.8	0.44	2	49	0.20 0.21	<0.02 (2)	R7795 R4019

[1] France N: France, north.

[2] France S: France, south.

CEREALS, country, year (variety)	Form	Application kg ai/ha	kg ai/hl	no.	PHI, days	Residues, mg/kg folpet	phthalimide	Ref
France S 1993 (Volga)	SC	1.8	0.44	2	40	<0.02 0.16	<0.02 (2)	R7795 R4019
France N 1996 (Plaisant)	SC	0.79 0.75	0.32 0.30	2	56	0.02 0.03		R9376 96025/F1-RFWC
France S 1996 (Volga)	SC	0.79 0.78	0.39 0.31	2	55	0.02 (2)		R9376 96025/F1-RFWC
WHEAT, WINTER								
France N 1992 (Scipion)	SC	1.8	0.58	2	50	0.050		R7150 RF2095
France N 1992 (Pepital)	SC	1.8	0.58	2	51	<0.04		R7150 RF2095
France N 1992 (Rossini)	SC	1.8	0.58	2	51	<0.04		R7150 RF2095
France N 1992 (Genial)	SC	1.8	0.58	1	37	0.050		R7150 RF2095
France N 1993 (Scipion)	WG	1.8	0.59	2	33 [DJH4]	0.20		R7795 R4019
France S 1993 (Gala)	WG	1.8	0.44	2	49	0.05		R7795 R4019
France N 1993 (Scipion)	SC	1.8	0.58	2	33	1.1		R7795 R4019
France S 1993 (Gala)	SC	1.8	0.44	2	49	0.03		R7795 R4019
France 1994 (Thésée)	SC	0.84	0.24	1	58	<0.02 (3)		R8111 RF4088-2
France 1994 (Thésée)	SC	0.77 0.68	0.24	2	43	<0.02 (3)		R8111 RF4088-2
France N 1995	SC	0.75	0.3	2	61	<0.02		R8676 R5072
France S 1995	SC	0.75	0.25	2	44	<0.02		R8676 R5072
France S 1995	SC	0.75	0.25	2	33	<0.02		R8676 R5072
France N (Soisson) 1996	SC	0.79	0.32	2	59	0.02 (2)		R9376 96025/F1-RFWC
France S (Tremie) 1996	SC	0.74 0.79	0.30 0.32	2	56	0.02 (2)		R9376 96025/F1-RFWC
Germany 1995 (Haven)	SC	0.75	0.25	2	35	0.02		R8444 95176/01-RP
UK 1995 (Hunter)	WG	1.6	0.8	2	39	0.08		R8559-5 OA00341/R52855 OPS/00514/MAK
UK 1995 (variety?)	WG	1.6	0.8	2	39 45	0.04 0.01		R8559-6 OA00344/R52855 OPS/00514/MAK
UK 1995 (Spark, Torfrida, Turpin)	WG	1.6	0.8	2	36	0.07		R8580-1 OA00346/R52862 OPS/00519/MAK
UK 1995 (Riband)	WG	1.6	0.8	2	39 45	0.06 0.11		R8580-2 OA00345/R52862 OPS/00519/MAK

Table 22. Folpet residues in cereal fodder resulting from supervised trials in France, Germany and UK. Analyses of replicate field samples from one plot or from duplicate plots in one trial are shown separately.

CEREAL FODDER, country, year	Application	PHI, days	Residues, mg/kg	Ref

(variety)	Form	kg ai/ha	kg ai/hl	no.		folpet	
BARLEY STRAW							
France N 1992 (Alpha)	SC	1.8	0.58	2	53	0.62	R7150[DJH5] RF2095
France N[1] 1992 (Reinette)	SC	1.8	0.58	2	52	1.2	R7150 RF2095
France N 1992 (Plaisant)	SC	1.8	0.58	2	47	0.56	R7150 RF2095
France N 1992 (Plaisant)	SC	1.8	0.58	2	47	0.28	R7150 RF2095
France N 1993 (Pastoral)	WG	1.8	0.59	2	56	3.0 c0.19	R7795 R4019
France S[1] 1993 (Plaisant)	WG	1.8	0.44	2	49	13 c0.25	R7795 R4019
France S 1993 (Volga)	WG	1.8	0.44	2	40	4.3 c0.10	R7795 R4019
France N 1993 (Pastoral)	SC	1.8	0.58	2	56	0.90 c0.19	R7795 R4019
France S 1993 (Plaisant)	SC	1.8	0.44	2	49	1.6 c0.25	R7795 R4019
France S 1993 (Volga)	SC	1.8	0.44	2	40	9.8 c0.10	R7795 R4019
France N 1996 (Plaisant)	SC	0.79 0.75	0.32 0.30	2	56	3.5 4.5	R9376 96025/F1-RFWC
France S 1996 (Volga)	SC	0.79 0.78	0.39 0.31	2	55	2.4 2.9	R9376 96025/F1-RFWC
WHEAT STRAW							
France N 1992 (Scipion)	SC	1.8	0.58	2	50	1.3	R7150 RF2095
France N 1992 (Pepital)	SC	1.8	0.58	2	51	1.8	R7150 RF2095
France N 1992 (Rossini)	SC	1.8	0.58	2	51	1.5	R7150 RF2095
France N 1992 (Genial)	SC	1.8	0.58	1	37	0.90	R7150 RF2095
France N 1993 (Scipion)	WG	1.8	0.59	2	33	5.6 c0.16	R7795 R4019
France S 1993 (Gala)	WG	1.8	0.44	2	49	14	R7795 R4019
France N 1993 (Scipion)	SC	1.8	0.58	2	33	10 c0.16	R7795 R4019
France S 1993 (Gala)	SC	1.8	0.44	2	49	7.0	R7795 R4019
France 1994 (Thésée)	SC	0.84	0.24	1	58	1.2 1.3 1.1 c0.22	R8111 RF4088-2
France 1994 (Thésée)	SC	0.77 0.68	0.24	2	43	2.8 2.9 3.1 c0.16	R8111 RF4088-2
France N 1995	SC	0.75	0.3	2	61	3.1 c0.47	R8676 R5072
France S 1995	SC	0.75	0.25	2	44	3.5 c0.70	R8676 R5072
France S 1995	SC	0.75	0.25	2	33	1.1 c0.19	R8676 R5072
France N (Soisson) 1996	SC	0.79	0.32	2	59	2.1 3.2	R9376 96025/F1-RFWC
France S (Tremie) 1996	SC	0.74 0.79	0.30 0.32	2	56	4.3 3.9	R9376 96025/F1-RFWC
Germany 1995 (Haven)	SC	0.75	0.25	2	35	4.6	R8444 95176/01-RP
UK 1995 (Hunter)	WG	1.6	0.8	2	39	4.3	R8559-5 OA00341/R52855 OPS/00514/MAK

[1] France S: France, south.

CEREAL FODDER, country, year (variety)	Application				PHI, days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	
UK 1995	WG	1.6	0.8	2	39	0.90 c0.11	R8559-6
					45	5.4 c0.28	OA00344/R52855
							OPS/00514/MAK
UK 1995 (Spark, Torfrida, Turpin)	WG	1.6	0.8	2	36	16	R8580-1
							OA00346/R52862
							OPS/00519/MAK
UK 1995 (Riband)	WG	1.6	0.8	2	39	11	R8580-2
					45	5.8	OA00345/R52862
							OPS/00519/MAK

c: sample from control plot

Table 23. Folpet residues in cereal forage resulting from supervised trials in France, Germany and UK. Analyses of replicate field samples from one plot or from duplicate plots in one trial are shown separately.

CEREAL FORAGE, country, year (variety)	Application				PHI, days	Residues, mg/kg	Ref
	Form	kg ai/ha	kg ai/hl	no.		folpet	
BARLEY WHOLE PLANT							
France N 1993	WG	1.8	0.59	2	36	1.3	R7795
(Pastoral)					47	2.7 c0.35	R4019
France N 1993	SC	1.8	0.58	2	36	1.6	R7795
(Pastoral)					47	1.8 c0.35	R4019
WHEAT WHOLE PLANT							
France N 1993	WG	1.8	0.59	2	25	4.4	R7795
(Scipion)					33	4.4 c0.06	R4019
France S 1993	WG	1.8	0.44	2	19	32 c0.23	R7795
(Gala)					34	13	R4019
France N 1993	SC	1.8	0.58	2	25	6.7	R7795
(Scipion)					33	8.9 c0.06	R4019
France S 1993	SC	1.8	0.44	2	19	16 c0.23	R7795
(Gala)					34	8.0	R4019
France 1994	SC	0.84	0.24	1	1 hr	8.6 9.9 10 c0.18	R8111
(Thésée)					30	2.1 1.7 1.6 c0.21	RF4088-2
France 1994	SC	0.77	0.24	2	1 hour	11 11 13 c0.15	R8111
(Thésée)		0.68			30	1.3 1.2 3.0 c0.18	RF4088-2
Germany 1995	SC	0.75	0.25	1	27	1.1	R8444
(Haven)				22	3 hr	5.4	95176/01-RP
					10	2.1 e2.3	
					21	1.7 e1.9 c0.12	
UK 1995	WG	1.6	0.8	1	25	18	R8559-6
				2	1 hr	58	OA00344/R52855
					19	e2.3 stem 22	OPS/00514/MAK
UK 1995 (Riband)	WG	1.6	0.8	1	25	11	R8580-2
				2	1 hr	29	OA00345/R52862
					19	e0.28 stem 11	OPS/00519/MAK

c: control sample. e: ears.

Table 24. Interpretation table for folpet residues on apples, grapes, strawberries, onions, cucumbers, melons, tomatoes, lettuce and potatoes from trials in Tables 13-20 and from 1993 Evaluations. GAP and trial conditions are compared for treatments considered valid for estimation of maximum residue levels and STMRs.

Crop	Country	Use pattern				Trial	folpet, mg/kg
		kg ai/ha	kg ai/hl	No of appl	PHI days		

Crop	Country	Use pattern				Trial	folpet, mg/kg
		kg ai/ha	kg ai/hl	No of appl	PHI days		
Apple	Argentina GAP		0.12		15		
Apple	Argentina trial	3.6	0.12	3	10	AA950314.07	1.4
Apple	Argentina trial	3.6	0.12	3	10	AA950314.08	2.6
Apple	Hungary GAP	1.5			10		
Apple	Hungary trial	1.6	0.10	8	10	MAK374-01	8.0
Apple	Portugal GAP		0.13		21		
Apple	[1]Portugal trial	1.3	0.13	10	21	FP/25/91	1.8
Apple	Portugal trial	1.6	0.13	8	21	MAK/374-05	3.2
Apple	Spain GAP		0.15		10		
Apple	Spain trial	1.9	0.16	6	10	MAK/374-04	3.1
Apple	Switzerland GAP		0.08		21		
Apple	Switzerland trial	2.0	0.10	4	21	MAK/374-03	3.4
Grapes	Argentina GAP		0.13		7		
Grapes	Argentina trial	1.0	0.13	4	7	AA950313.07	1.6
Grape	France GAP	1.5			21		
Grape	France trial	1.5		8	27	R7194	1.9
Grape	France trial	1.5		7	21	R7194	1.6
Grape	France trial	1.6	0.50	8	21	R-9146 FR03	2.2
Grape	France trial	1.4	0.50	8	21	R-9146 FR02	2.4
Grape	France trial	1.5	0.47	8	21	R-9146 FR01	3.1
Grape	France trial	1.5	0.60	9	21	R-9146 FR04	2.8
Grape	France trial	1.9-2.0	0.57-0.76	8	21	R9098	5.8
Grape	France trial	1.9	0.55-0.78	8	21 (28)[2]	R9098	3.5
Grape	France trial	1.4-1.6	0.57-0.63	8	21	R9098	1.9
Grape	France trial	1.6-2.0	0.64-0.84	8	21	R9098	4.6
Grape	France trial	1.7-1.9	0.49-0.76	8	21	R9098	5.7
Grape	France trial	1.3-1.6	0.54-0.65	8	21	R9098	5.9
Grapes	Italy GAP		0.16		10		
Grapes	Italy trial	1.6	0.16	5	10	AA950313.03	3.3
Strawberries	Spain GAP		0.15		21		
Strawberries	Italy trial	0.89	0.15	3	21	R-8989	<0.01
Strawberries	Italy trial	0.76	0.13	3	21	R9093	0.04
Strawberries	Italy trial	0.75	0.13	3	21	R9383	0.09
Strawberries	Mexico GAP	1.3			no limit		
Strawberries	Mexico trial	1.2	0.62	4	2	950310.01	1.8
Strawberries	Mexico trial	1.2	0.26	4	2	950310.02	1.6
Strawberries	Mexico trial	1.2	0.33	4	2	950310.03	2.2
Strawberries	Netherlands GAP		0.13	g	14		
Strawberries	Netherlands trial	1.4	0.13	2 pt	14	MAK/372.01	1.9
Strawberries	Netherlands trial	1.3	0.13	2 pt	14	MAK/372.01	1.6
Strawberries	Netherlands trial	1.3	0.13	2 pt	14	MAK/372.02	1.4
Onions	Chile GAP	2.0	0.13		7		
Onions	Chile trial	2.0	0.13	3	7	AA950307.03	0.36
Onions	Portugal GAP		0.13		7		
Onions	Portugal trial	0.54	0.13	3	7	MAK/377-08	5.0
Onions	Spain trial	0.65	0.16	3	10	MAK/377-09	2.5
Melons	Greece GAP		0.16		20		
Melons	Greece trial	0.98	0.12	4	20	MAK/373-01	<0.05
Melons	Greece trial	0.97	0.12	4	20	MAK/373-02	<0.05
Tomato	Chile GAP	1.7	0.15		7		
Tomato	Chile trial	1.7	1.5	7	7	R-9141t	2.4
Tomato	Hungary GAP		0.13		14		
Tomato	Hungary trial	0.65	0.13	3	14	MAK/375.01	<0.05
Tomato	Hungary trial	0.65	0.13	3	14	MAK/375.04	<0.05
Tomato	Hungary trial	0.65	0.13	3	14	MAK/375.02	<0.05
Tomato	Hungary trial	0.66	0.13	3	14	MAK/375.03	<0.05
Tomato	[1]Hungary trial	0.63	0.12	5	14	FP/26/91	<0.02
Tomato	Mexico GAP	2.0			no limit		
Tomato	Mexico trial	2.0	0.67	5	2	AA950311.01	1.0

[1] From 1993 JMPR

[2] The residue on day 28 (3.5 mg/kg) exceeded the residue on day 21 (2.6 mg/kg).

Crop	Country	Use pattern				Trial	folpet, mg/kg
		kg ai/ha	kg ai/hl	No of appl	PHI days		
Tomato	Mexico trial	2.0	0.71	5	2	AA950311.04	1.6
Tomato	Mexico trial	2.0	0.66	5	2	AA950311.05	1.8
Tomato	Mexico trial	2.0	0.71	5	2	AA950311.02	0.45
Tomato	Mexico trial	2.0	0.72	5	2	AA950311.03	1.3
Tomato	Portugal GAP		0.13		7		
Tomato	Portugal trial	1.3	0.16	4	7	MAK/375.08	0.34
Tomato	Portugal trial	1.3	0.16	4	7	MAK/375.09	0.58
Tomato	Spain GAP		0.15		10		
Tomato	Italy trial	1.2	0.13	4	10	R-8987	0.60
Tomato	Italy trial	1.3	0.13	4	10	ERSA-DA-14/96	0.70
Tomato	Italy trial	1.3	0.13	4	10 (14)[1]	ERSA-DA-08/96	0.80
Tomato	Italy trial	1.2	0.13	4	10	ERSA-DA-11/95	0.43
Tomato	Spain trial	1.6	0.20	6	10	MAK/375.06	1.3
Tomato	Spain trial	2.5	0.16	6	10	MAK/375.07	1.2
Lettuce	Portugal GAP		0.13		14		
Lettuce, Head	Portugal trial	0.52	0.13	3	14	MAK/378-09	4.3
Lettuce	Spain GAP		0.15		21		
Lettuce, Leaf	Spain trial	0.78	0.16	4	21	MAK/378-08	<0.05
Potato	Spain GAP		0.15		10		
Potato	Italy trial	1.3	0.13	4	10	R8988	0.08
Potato	Italy trial	1.2	0.13	3	10	R9094	<0.01
Potato	Italy trial	1.3	0.13	3	10	R9261	<0.01
Potato	Italy trial	1.3	0.13	4	10	R9374	<0.01

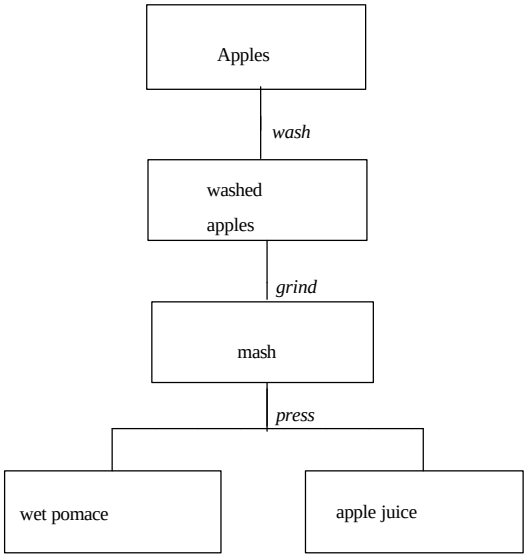
g: glasshouse use pt: plastic tunnel use

FATE OF RESIDUES IN STORAGE AND PROCESSING

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

[1] The residue on day 14 (0.80 mg/kg) exceeded the residue on day 10 (0.62 mg/kg).

Leppert (1996a) applied folpet four times at 2.9 kg ai/ha (spray 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 harvested 7 days after the final application (49 kg) were processed into wet pomace and juice. Residue levels on the unwashed and washed apples and processed commodities are shown in Table 13 (Hurley and Farthing 1996e, trial SARS-95-50).



Armstrong and Luke (1995) processed the apples to simulate commercial practice as closely as possible. Apples were washed, then ground in a hammer-mill to produce a wet mash. The wet mash was pressed in a hydraulic press to separate the juice and wet pomace. The results are shown in Table 25.

Table 25. Folpet residues in apples, pomace and juice after processing (Leppert 1996a, Armstrong and Luke 1995, Hurley and Farthing 1996e).

Commodity	Folpet, mg/kg	Processing factor
Apples, unwashed	2.1	
Apples, washed	1.2	0.60
Wet pomace	5.4	2.6
Apple juice	0.072	0.035

Singer (1997g) dipped 74 kg grapes (Thomson Seedless) in 7-10 kg portions for 30 seconds into a vat containing folpet spray mixture at 1.25 kg ai/hl, 5 times the maximum permitted concentration 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 weighed and dried in the sun to unprocessed raisins. Grapes and stems were spread out on stainless steel screens on tables covered with black plastic and dried until the moisture level had dropped to 12-16%. Samples of the unprocessed raisins were then placed in the freezer. The remainder of the 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 were subsequently rehydrated to 18-20% moisture to produce raisins.

Grapes were processed in a crusher/destemmer, which crushes the berries and separates the stems from the crushed berries and juice. Crushed berries and juice were treated with an enzyme and 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 and filtered through diatomaceous earth, then placed in cold storage for 6 weeks to allow settling. Clear juice was then produced by filtration through diatomaceous earth, heated to canning temperature (94°C) and canned. Folpet residues in the grapes and processed commodities are shown in Table 26 (Farthing, 1996d).

Table 26. Folpet residues in grapes, juice and raisins produced from grapes dipped in a vat containing a 1.25 kg ai/hl folpet spray mixture (Singer 1997g, Abdelrahim 1996, Farthing, 1996d).

Commodity	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
Raisins (hydrated)	31, 28, 27	1.9

Folpet residues were not detected in the grape juice and were presumably lost in filtration or heating. Residues were concentrated during the drying process to produce raisins. The processing factors are included in Table 26.

In two trials in France, Wasser (1996a) treated grapes 6 times with folpet (SC and WG formulations) at 1.5 kg ai/ha and harvested the grapes 52 days after the final application. Residues were measured in the grapes and must, wine and spirits. The results are shown in Table 14 (trial R 5011). Some folpet residues appeared in the must, but none in the wine or spirits.

Folpet and phthalimide residues were measured in treated grapes and the must and wine produced from them in a series of trials in Germany. Treatment details are recorded in Table 14. Residue data for the processed commodities and the processing factors are shown in Table 27.

Table 27. Residue data and processing factors for folpet and phthalimide in grapes, must and wine after grapes were sprayed with folpet. Application details are provided in Table 14.

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

Commodity	Residues, mg/kg		Processing factor	Processing yield	Reference
	folpet	phthalimide	folpet	phthalimide	
Grapes	0.42	<0.1			R-7993
Must	0.27	0.37	g→m 0.64	g→m 1.8	HVA 7/94
Wine	<0.05	0.35	g→w 0 (<0.12)	g→w 1.7	UHL16

The processing factors for folpet residues from grapes to must and wine were 0, 0, 0, 0.15, 0.21, 0.25, 0.30, 0.39, 0.64 and 0.97, mean 0.29. Folpet was not detected in the wine so the processing factor is 0.

Phthalimide residues in must or wine may arise from phthalimide or folpet in the grapes either by transfer of the phthalimide or by conversion of folpet to phthalimide during the process. A processing yield for phthalimide has been calculated using the following formula.

$$\text{Processing yield} = \frac{\text{phthalimide residues in must or wine}}{(\text{folpet residues in grapes} \times 0.496) + (\text{phthalimide residues in grapes})}$$

The factor 0.496 is the ratio of the molecular weight of phthalimide (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, mean 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, mean 0.90. This value suggests that most of the folpet on the grapes is converted to phthalimide, which finds its way into wine during the vinification process.

Leppert (1996b) applied folpet five times at 2.2 kg ai/ha (spray 0.58 kg ai/hl) to tomato plants in a processing trial in California. The treated plot was 186 m^2. Fruit were harvested 7 days after the final application (152 kg) and processed into tomato purée and paste. Residue levels in the unwashed tomatoes and processed commodities are shown in Table 18 (trial SARS-95-51).

Tomatoes were initially soaked in 0.5% sodium hydroxide for 3 minutes and then rinsed with a high pressure spray rinse for 30 seconds. The tomatoes were crushed, rapidly heated and held for 15 seconds in a steam jacketed kettle and then separated into pulp and juice. Purée was produced from juice by evaporation and adjustment of salt and water levels, then heated and canned. 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 (<0.028).

Residues in the edible portion of food commodities

A head lettuce trial 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.

Folpet residues were not detected (<0.05 mg/kg) in wine produced from treated grapes in a series of trials in Germany. The mean processing yield for phthalimide from grapes to wine was 0.90, suggesting that most of the folpet on the grapes is converted to phthalimide which finds its way into wine during the vinification process.

Folpet residues were not detected (<0.05 mg/kg) in tomato 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 (LOD 0.05 mg/kg) in 13 and none exceeded the MRL in France of 3 mg/kg. Folpet was not detected (LOD 0.02 mg/kg) in the 7 wines analysed.

Monitoring for folpet residues on food in commerce for the years 1994-1996 in The Netherlands was reported:

Commodity	Number of samples				MRL, mg/kg 1/
	Analysed	residues not detected <0.01 mg/kg	residues detected, but <MRL	residues >MRL	
Apricots	91	89	2	0	2
Grapes	765	763	2	0	3
Strawberries	2743	2736	6	1	3
Tomatoes	1247	1246	1	0	3
Aubergines	176	176	0	0	0.1*
Cucumbers	1089	1089	0	0	0.1*
Courgettes	259	257	0	0	0.1*
Lettuce	3843	3820	24	0	2
Iceberg lettuce	535	528	7	1	2
Spinach	532	530	0	2	0.1*

* MRL at LOD
1/ residue definition: sum of captan and folpet.

NATIONAL MAXIMUM RESIDUE LIMITS

The following MRLs for folpet have been established for apples, cucumbers, grapes, lettuce, melons, onions, strawberries and tomatoes.

Country	MRL, mg/kg							
	apple	cucumber	grape	lettuce	melon	onion	strawberry	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
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
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					

Germany and The Netherlands provided the following information on national MRLs (January 1998).

Country	MRL, mg/kg	Commodity
Germany[3]	3	pome fruit, small fruits and berries, tomatoes
	2	beans (fresh), leek, lettuce, peas (fresh), scarole, stonefruit, witloof,
	0.1	other foods of plant origin
Netherlands[3]	3	pome fruit, berries and other small fruit (other than wild), tomatoes
	2	stone fruit, endive, head lettuce, iceberg lettuce, cos-lettuce, witloof, leeks, legume vegetables
	0.1*	other fruit, other vegetables
	0*(0.1)	other food commodities

* at or about the LOD

[1] Directive 76/893/EEC

[2] t - table grapes. w - wine grapes.

[3] Residue definition: sum of captan and folpet.

APPRAISAL

Folpet was first evaluated in 1969 and has been reviewed several times since. It was listed by the 1997 CCPR (29th Session, ALINORM 97/24A, Appendix III) for periodic re-evaluation for residues by the 1998 JMPR. Residue aspects were reviewed in 1997, when it was agreed that the 1997 review would be included in the 1998 Periodic Review for completeness. The Meeting received information on metabolism, analytical methods, freezer storage stability, registered uses, data from supervised trials on fruit and vegetable crops and processing studies.

When a lactating goat was dosed orally with [*trichloromethyl*-^{14}C]folpet at 0.55 mg/kg bw (equivalent to 20 ppm in the feed) daily for 3 days, most of the dose was rapidly excreted in the faeces (42% of the dose) and in expired air (31%). ^{14}C levels in the milk were 0.23-0.38 mg/kg as folpet and accounted for 1% of the dose. The tissues contained ^{14}C at 0.8% of the dose with most in the liver and kidneys (0.34 and 0.26 mg/kg respectively, expressed as folpet).

When a lactating goat was dosed orally with [*benzene*-^{14}C]folpet at 0.34 mg/kg bw (equivalent to 14 ppm in the feed) daily for 6 days 93% of the ^{14}C was excreted in the urine and faeces. The ^{14}C in the tissues and milk constituted less than 0.1% of the dose. ^{14}C levels (expressed as folpet) in the milk, liver and kidneys were 0.004-0.006, 0.022 and 0.052 mg/kg respectively.

The metabolism studies showed that folpet is rapidly degraded in goats, initially by loss of the CCl_3 group. The carbon from the CCl_3 becomes incorporated into thiazolidine and natural products. The remainder of the molecule was metabolized to phthalimide and phthalamic acid.

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 part (<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.

Levels of ^{14}C were lower in the roots than in the straw or grain of wheat treated with [*benzene*-^{14}C]folpet at a rate equivalent to 1.6 kg ai/ha and harvested 43 and 54 days after the second treatment. Folpet was the major component of the residue in or on the straw (4.7 mg/kg) and grain (9.3 mg/kg), with 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 prominent.

When Thomson Seedless grape vines were treated 3 times with [*benzene*-^{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 [*benzene*-^{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 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 amounted to about 0.7 mg/kg. Folpet and phthalimide residues were mainly on the peel, but most of the phthalic acid was in the pulp.

No information was provided on the environmental fate of folpet in soil or water/sediment systems. Such studies are needed for a periodic review (page 13 of *FAO Manual on the Submission and Evaluation of Pesticide Residues Data for the Estimation of Maximum Residue Levels in Food*

and Feed). The Meeting was informed at a late stage that studies were available on aerobic and anaerobic degradation and photolysis in soil, field dissipation, adsorption, desorption and mobility in soil, leaching of aged residues and aqueous photolysis.

The Meeting agreed to withdraw its previous recommendations for MRLs and agreed that maximum residue levels estimated from the trials could not be recommended as suitable for establishing MRLs until these critical supporting studies had been evaluated.

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. Methods were validated for all the above commodities and some others. The recovery of folpet from various fortified commodities was commonly 70-100%, but with some excursions outside this range. In a total of 340 recovery tests the mean and median were 87% and 86% respectively. The LOD was 0.05 mg/kg.

Care is needed that there is no opportunity for conversion of folpet to phthalimide during analysis because folpet is very susceptible to hydrolysis.

Cereal grains and straw in the UK trials were analysed by an HPLC method with an LOD of 0.05 mg/kg. Folpet residues were extracted with ethyl acetate and clean-up was effected by gel permeation chromatography. Separations were on a reversed-phase column with an acetonitrile-water mobile phase.

Folpet is included in an official multi-residue method of The Netherlands for pesticides amenable to gas chromatography. LODs for various matrices are 0.01-0.05 mg/kg.

Folpet residues were shown to be stable during frozen 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), potatoes (55 days), tomato paste (30 days), tomato purée (31 days), tomatoes (136 days), chopped wheat grain (366 days) and chopped wheat straw (366 days).

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

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

Information was made available to the Meeting on registered uses of folpet and on supervised trials on apples, grapes, strawberries, onions, cucumbers, melons, tomatoes, lettuce, potatoes, barley, wheat, cereal fodder and cereal forage. Relevant data from the 1993 and 1994 monographs were also included where possible to support the evaluations.

Trials on apples were reported from Argentina, Canada, Chile, France, Hungary, Germany, Poland, Portugal, Spain, Switzerland and the USA. Six trials in Germany and one in Poland suggest that folpet residues on apples decrease quite slowly and that some latitude in the PHI can be accepted in evaluating the trials.

Folpet is registered in Argentina for use on apples with a spray concentration of 0.12 kg ai/hl and a PHI of 15 days. Residues in apples from 2 trials where the spray concentration accorded with GAP but the PHI was 10 days (sufficiently close for a persistent residue) were 1.4 and 2.6 mg/kg.

The Canadian trials were based on a PHI of 7 days, which was too remote from Canadian GAP (1 day) to be used. Trials in France, Germany and the USA were not evaluated because labels with relevant GAP were not available. No field report was available for the trial in Poland.

Two trials on apples in Chile where the trial conditions corresponded to the registered application rate (2.0 kg ai/ha), but the harvest was 7 days after the final application instead of the official 3 days, could not be evaluated because the difference in the PHI was too great .

In a Hungarian trial according to GAP (application at 1.6 kg ai/ha and a PHI of 10 days), the highest folpet residue on apples was 8.0 mg/kg. In a Swiss trial which complied with GAP (spray concentration of 0.10 kg ai/hl and a PHI of 21 days), the residue was 3.4 mg/kg, and in a Spanish trial complying with GAP (spray concentration of 0.16 kg ai/hl and a PHI of 10 days), the highest residue was 3.1 mg/kg.

Folpet may be sprayed at 0.13 kg ai/hl on apples in Portugal with the harvest 21 days after the final application. In a trial meeting these conditions the folpet residue on apples was 3.2 mg/kg. In a trial recorded in the 1993 Evaluations folpet was applied 10 times at a concentration of 0.13 kg ai/hl and the resulting residue 21 days after the final application was 1.8 mg/kg

In summary, the folpet residues in apples from trials according to GAP were Argentina 1.4 and 2.6 mg/kg, Chile 2.0 and 3.7 mg/kg, Hungary 8.0 mg/kg, Switzerland 3.4 mg/kg, Spain 3.1 mg/kg and Portugal 1.8 and 3.2 mg/kg. The residues in rank order (median underlined) in the 7 trials were 1.4, 1.8, 2.6, <u>3.1</u>, 3.2, 3.4 and 8.0 mg/kg.

The Meeting estimated a maximum residue level for folpet in apples of 10 mg/kg but could not recommend it as suitable for use as an MRL until the critical supporting studies on environmental fate have been evaluated.

The folpet residue in grapes was 1.6 mg/kg in a supervised trial that complied with GAP in Argentina (spray concentration 0.13 kg ai/hl and PHI 7 days).

Italian GAP permits application to table grapes at a spray concentration of 0.16 kg ai/hl with harvest 10 days after the final application. In an Italian trial under these conditions the folpet residue was 3.3 mg/kg. A second Italian trial could not be evaluated because the PHI of 41 days was too long.

Folpet may be used on grapes in France at 1.0-1.5 kg ai/ha (SC and WG formulations) or 1.0-1.8 kg ai/ha (WP formulations) with specified PHIs of 21 and 30 days for SC, 21 and 28 days for WG and 28 days for WP. Variations of rate and PHI may depend on other fungicides in the same formulation. Trials in France in 1992, 1994, 1995 and 1996 were accepted as complying with maximum GAP conditions where the application rate was within 30% of 1.5 kg ai/ha and the PHI was 16-28 days. The residues in grapes from 12 trials meeting these conditions in rank order (median underlined) were 1.6, 1.9, 1.9, 2.2, 2.4, <u>2.8</u>, <u>3.1</u>, 3.5, 4.6, 5.7, 5.8 and 5.9 mg/kg.

Trials in Chile could not be evaluated because the interval between final application and harvest was 14 days whereas GAP specifies 3 days. Trials in Germany and Russia could not be evaluated because relevant GAP and registered labels were not available.

In summary, the folpet residues in grapes from trials according to GAP were Argentina 1.6 mg/kg, Italy 3.3 mg/kg and France 1.6, 1.9, 1.9, 2.2, 2.4, 2.8, 3.1, 3.5, 4.6, 5.7, 5.8 and 5.9 mg/kg. The residues in rank order (median underlined) in the 14 trials were 1.6, 1.6, 1.9, 1.9, 2.2, 2.4, <u>2.8</u>, <u>3.1</u>, 3.3, 3.5, 4.6, 5.7, 5.8 and 5.9 mg/kg

The Meeting estimated a maximum residue level for folpet on grapes of 10 mg/kg but could not recommend it as suitable for use as an MRL until the critical supporting studies on environmental fate have been evaluated.

Folpet is registered for use on strawberries in Spain at a spray concentration of 0.15 kg ai/hl with a PHI of 21 days. The residues in three trials in Italy according to Spanish GAP were <0.01, 0.04 and 0.09 mg/kg. Data from a fourth Italian trial could not be used because the longest interval between the final application and harvest was 14 days.

Mexican GAP permits the application of folpet to strawberries at 1.3 kg ai/ha with no restriction on the PHI (the label statement is "interval between final application and harvest – no limit"). The residues in 3 Mexican trials complying with GAP (the PHI of 2 days is sufficiently close to the label statement, which implies a 0-day PHI) were 1.6, 1.8 and 2.2 mg/kg.

In three trials on strawberries in plastic tunnels in The Netherlands which complied with glasshouse GAP (spray concentration 0.13 kg ai/hl and 14 days PHI) the folpet residues were 1.4, 1.6 and 1.9 mg/kg.

In summary, the folpet residues in strawberries from trials according to GAP were Italy <0.01, 0.04 and 0.09 mg/kg, Mexico 1.6, 1.8 and 2.2 mg/kg and The Netherlands 1.4, 1.6 and 1.9 mg/kg. The Meeting agreed that the data from Italy appeared to be in a different population from the others and should not be considered for the estimation of an STMR. The folpet residues in strawberries in rank order (median underlined) in the 6 trials were 1.4, 1.6, <u>1.6</u>, <u>1.8</u>, 1.9 and 2.2 mg/kg.

The Meeting estimated a maximum residue level for folpet on strawberries of 5 mg/kg but could not recommend it as suitable for use as an MRL until the critical supporting studies on environmental fate have been evaluated.

The folpet residues in onions from a trial in Chile complying with GAP (2 kg ai/ha and 7 days PHI) was 0.36 mg/kg. Portuguese GAP for onions allows a spray concentration of 0.13 kg ai/hl and a 7 days PHI. Folpet residues in a Portuguese and a Spanish trial which complied with GAP were 5.0 and 2.5 mg/kg respectively. (The PHI in Spain was 10 days).

Trials in Greece could not be evaluated because the PHIs were 20 days whereas Greek GAP does not specify the PHI, suggesting that 0 days is permissible. Similarly, Hungarian data could not be used because the PHIs in the trials were 14 days, while Hungarian GAP specifies 5 days. Mexican trials also could not be evaluated because the label does not limit the PHI, implying 0 days, while the interval in the trials was 7 days. No relevant GAP was available for the evaluation of trials in The Netherlands and Germany.

The Meeting could not estimate a maximum residue level for folpet in onions because there were too few trials (3) according to GAP.

Folpet may be used on cucumbers in Mexico at 1.8 kg ai/ha with no limit for the PHI, implying that harvest on the day of the final application is permissible. In the 4 trials in Mexico the PHI was 3 days, which was too far from 0 days to be considered as maximum GAP for such a rapidly growing crop as cucumbers. The single Canadian trial could not be used because the trial conditions did not correspond to GAP.

The Meeting agreed to withdraw the recommendation of the 1994 JMPR for folpet on cucumbers (0.5 mg/kg).

In Greece folpet is registered for use on melons with a spray concentration of 0.16 kg ai/hl and a PHI of 20 days. Folpet residues were below the LOD (<0.05 mg/kg) in melons from 2 Greek trials complying with GAP (0.12 kg ai/hl and 20 days PHI).

GAP in Honduras permits a spray concentration of 0.13 kg ai/hl with harvest 7 days after the final application. Melons were harvested 3 days after the final application in one trial in Guatemala and 2 trials in Honduras but the data could not be used because the interval was too short to be considered to comply with GAP for Honduras.

Mexican GAP permits application at 1.8 kg ai/ha with harvest on the day of the final application (the label does not limit the PHI). The three trials in Mexico could not be evaluated because the interval between the final application and harvest was 7 days, which is not sufficiently close to maximum GAP.

The Meeting agreed to withdraw the 1997 recommendation for folpet in melons (3 mg/kg) because there were too few trials (2) according to GAP.

Data were available from supervised trials on tomatoes in Chile, Hungary, Italy, Mexico, The Netherlands, Portugal, Spain and the USA. Trials in the USA and The Netherlands, and trials in plastic greenhouses in Italy could not be evaluated because no relevant GAP was available.

The folpet residue in tomatoes from a trial in Chile complying with GAP (1.7 kg ai/ha and 7 days PHI) was 2.4 mg/kg. Mexican GAP permits application of folpet to tomatoes at 2.0 kg ai/ha and harvest without timing restriction. The residues in tomatoes in five Mexican trials complying with GAP (the PHI of 2 days is sufficiently close to the implied 0 days of GAP) were 0.45, 1.0, 1.3, 1.6 and 1.8 mg/kg.

In Hungary folpet is registered for use on tomatoes at a spray concentration of 0.13 kg ai/hl with harvest 14 days after the final application. In four Hungarian trials with conditions complying with GAP and in one recorded in the 1993 Evaluations complying with GAP, the residues were all below the LOD (<0.02 and <0.05 mg/kg (4)).

In two Portuguese trials (0.16 kg ai/hl and 7 days PHI) in compliance with Portuguese GAP (0.13 kg ai/hl and 7 days PHI) the residues were 0.34 and 0.58 mg/kg.

Folpet is registered for use on tomatoes in Spain at a spray concentration of 0.15 kg ai/hl with a 10 days PHI. The residues in two Spanish and four Italian trials substantially according to Spanish GAP were 1.2 and 1.3 mg/kg in Spain and 0.43, 0.60, 0.70 and 0.80 mg/kg in Italy.

In summary, the folpet residues in tomatoes from trials according to GAP were Chile 2.4 mg/kg, Mexico 0.45, 1.0, 1.3, 1.6 and 1.8 mg/kg, Hungary <0.02 and <0.05 4 mg/kg, Portugal 0.34 and 0.58 mg/kg, Spain 1.2 and 1.3 mg/kg and Italy 0.43, 0.60, 0.70 and 0.80 mg/kg. The residues in rank order in the 19 trials were <0.02, <0.05 (4), 0.34, 0.43, 0.45, 0.58, 0.6, 0.7, 0.80, 1.0, 1.2, 1.3, 1.3, 1.6, 1.8 and 2.4 mg/kg

The residues from the Hungarian trials appear to be in a different population from the others. The residues in the 14 trials in the other countries (median underlined) which were used to estimate an STMR for tomatoes were 0.34, 0.43, 0.45, 0.58, 0.6, 0.7, <u>0.80</u>, <u>1.0</u>, 1.2, 1.3, 1.3, 1.6, 1.8 and 2.4 mg/kg.

The Meeting estimated a maximum residue level for folpet on tomatoes of 3 mg/kg but could not recommend it as suitable for use as an MRL until the critical supporting studies on environmental fate have been evaluated.

Portuguese GAP for the use of folpet on lettuce allows a 0.13 kg ai/hl spray with a 14 days PHI. The residue in head lettuce from a trial in Portugal complying with GAP was 4.3 mg/kg. A trial in Spain on leaf lettuce complied with Spanish GAP (0.13-0.15 kg ai/hl and 21 days PHI). The residue was undetectable (<0.05 mg/kg).

Trials in Greece could not be evaluated because the interval between the final application and harvest was 20 days whereas Greek GAP does not specify a PHI, implying that 0 days is permitted. Lettuce were harvested 7 days after the final application in Mexican trials, but again the registered use specifies no limit for the PHI, so the trial conditions were not sufficiently close to GAP. Trials in Hungary and Germany could not be evaluated because no relevant GAP was available.

The Meeting agreed that there were too few results to estimate a maximum residue level or STMR for lettuce.

Supervised trials on potatoes were carried out in Italy, Mexico, Poland, Russia and South Africa. Translocation to the tubers from foliar applications would not be expected from a compound with such low solubility in water as folpet. Occasional residues could occur if a tuber is exposed above the soil surface to direct spray.

Four Italian trials (0.13 kg ai/hl, 10 days PHI) complied with Spanish GAP (spray concentration 0.15 kg ai/hl and PHI 10 days). The residues were 0.08 and <0.01 (3) mg/kg.

No relevant GAP was available to evaluate the other trials.

There were too few results to estimate a maximum residue level or STMR. The Meeting recommended the withdrawal of the current CXL for folpet on potatoes (0.02* mg/kg).

Documented studies of numerous folpet trials in France and the UK on barley and wheat, which included extensive data on forage and fodder, were reported but could not be evaluated because no information on GAP supported by registered labels was made available. Field reports for many of the trials were lacking.

The Meeting noted that feeding studies on farm animals had not been reported. These would be needed before MRLs could be established for cereal grains, fodder and forage.

Studies of the effects of processing on folpet residues in apples, grapes and tomatoes were reported.

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

Grapes were treated post-harvest by dipping bunches for 30 seconds into a vat containing folpet (1.25 kg ai/hl). The grapes were allowed to dry and then processed into raisins and juice. Because folpet residues are on the surface the treatment was considered valid.

The treated grapes were dried in the sun until the moisture level had 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 grapes to juice is 0 (<0.003). Folpet residues in the dried raisins 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 (3.2) and the estimated maximum residue level in grapes (10 mg/kg).

In ten trials in Germany in 1993 residues of folpet were measured in must and wine produced from folpet-treated grapes. The processing factors for must ranged from 0 to 0.97 (mean 0.29). Folpet was not detected (<0.05 mg/kg) in any wine sample, so the processing factor was 0. The metabolite phthalimide was consistently present in the must and 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 five times with folpet (2.2 kg ai/ha) and harvested seven days after the final application for processing. 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 and adjustment of salt and water levels before 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 likely that the initial vigorous cleaning of the tomatoes and the sodium hydroxide treatment completely removed or destroyed the folpet. The estimated processing factor for the transfer of folpet from tomatoes to purée and paste is therefore 0.

RECOMMENDATIONS

The Meeting recommended the withdrawal of previous recommendations of the JMPR as shown below. Although the Meeting was able to estimate maximum residue levels for some commodities, they could not be recommended for use as MRLs because critical supporting studies on the environmental fate were not provided for the 1998 Meeting.

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

Commodity		MRL, mg/kg		STMR, mg/kg
CCN	Name	New	current	
FP 0226	Apple	W [1]	10	
VC 0424	Cucumber	W	0.5	
DF 0269	Dried grapes (currants, raisins and sultanas)	W [1]	40	
FB 0269	Grapes	W [1]	10	
VC 0046	Melons, except Watermelon	W	3	
VR 0589	Potato	W	0.02*	
FB 0275	Strawberry	W [1]	5	
VO 0448	Tomato	W [1]	3	

W: the previous recommendation is withdrawn.
[1] The previous recommendation is withdrawn because critical supporting studies on environmental fate have not been evaluated because they were not provided for the 1998 meeting.

* At or about the limit of determination

FURTHER WORK OR INFORMATION

Desirable

1. Expression of the residues found in forage and fodder on a dry-weight basis so that the results can be used in the estimation of maximum residue levels for animal commodities.

2. Studies on the environmental fate of folpet in soil and in water/sediment systems are needed before MRLs can be recommended for folpet (see page 13 of *Manual on the Submission and Evaluation of Pesticide Residues Data for the Estimation of Maximum Residue Levels in Food and Feed*).

DIETARY RISK ASSESSMENT

Recommendations for folpet MRLs have been withdrawn because critical supporting studies were not available for the periodic review. Consequently, no MRLs or STMRs are available for the estimation of dietary intake.

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[DJH1] R9496. Onion. Field report is lacking. What is the nature of the sample? What is the sprayer? {Answer of July – still to follow up.]
Page: 663
[DJH2] AnalysisPage: 663
date is Aug 1996, so samples could have been stored up to 16 months before analysis.
Page: 666
[DJH3] Are the replicates analytical replicates or replicate field samples? The variance suggests replicate samples but there is no clear statement.
Page: 667
[DJH4] Trial R7795 R4019. It is difficult to relate the data in the study to the data in the summary. In the study the PHIs appear to be 45 and 49 days whereas in the summary we have 33 and 49 days.
Page: 668
[DJH5] There is no field report for R7150 - size of plots, type of sprayer?
Page: 688
[DJH6] This report is deficient in lacking a field report. There is no information on plot areas and sprayers used. It is difficult to relate the study report to the summary because the recorded PHIs are different for some wheat trials.