CYPRODINIL

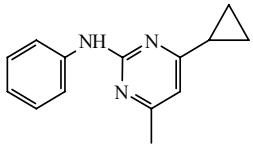
First draft prepared by Denis Hamilton, Department of Primary Industries, Brisbane, Australia

EXPLANATION

Residue and analytical aspects of cyprodinil were considered for the first time by the present Meeting.

Cyprodinil, a member of the anilinopyrimidine group, is a systemic foliar and seed dressing fungicide that acts as an inhibitor of methionine biosynthesis. It has registered uses in many countries on horticultural and cereal crops.

IDENTITY

ISO common name:	cyprodinil (ISO draft)
Synonyms or code numbers:	CGA 219417 (Syngenta)
IUPAC name:	(4-cyclopropyl-6-methyl-pyrimidin-2-yl)phenylamine
Chemical Abstracts name:	4-cyclopropyl-6-methyl-*N*-phenyl-2-pyrimidinamine
CAS number:	121552-61-2
Molecular formula:	$C_{14}H_{15}N_3$
Molecular mass:	225.3
Structural formula:	

PHYSICAL AND CHEMICAL PROPERTIES

Pure active ingredient

Characteristic	Value	Reference
Appearance:	fine white crystals	Das, 1998
Odour:	odourless	Das, 1998
Melting point:	75.9°C ±0.2ºC (99.9 ± 0.2% purity) 71.3°C (crystal form A) [1/] 76.4°C (crystal form B) [1/]	Rodler, 1992a Rordorf, 1992
Boiling point:	>360°C at standard pressure.	Das, 1997
Density:	1.21×10^3 kg/m^3 at 22ºC (99.9 ± 0.2% purity)	Füldner, 1992
Vapour pressure at 25°C:	5.1×10^{-4} Pa (crystal form A) [1/] 4.7×10^{-4} Pa (crystal form B) [1/] (extrapolation from measurements between 95.8°C and 156.3°C) 6.2×10^{-3} Pa (amorphous state) at 25°C.	Rordorf, 1992
Henry's law constant	6.6×10^{-3} to 7.2×10^{-3} Pa m^3/mol (calculated from vapour pressures of crystals)	Burkhard, 1995
Solubility in water	20 mg/l in pH 5.0 buffer at 25°C 13 mg/l in pH 7.0 buffer at 25°C 15 mg/l in pH 9.0 buffer at 25°C.	Rodler, 1992c
	16 mg/l in pure water, pH 7.6 at 25°C.	Stulz, 1994
Solubility in organic solvents at 25°C:	acetone >500 g/l dichloromethane >500 g/l ethyl acetate >500 g/l hexane 26 g/l methanol 150 g/l octanol 140 g/l toluene 440 g/l.	Stulz, 1998

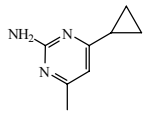
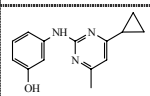
Characteristic	Value	Reference
Dissociation constant in water	$pK_a = 4.44$	Jäkel, 1992
Octanol/water partition coefficient:	log P_{ow} = 3.9 at pH 5.0 and 25°C; log P_{ow} = 4.0 at pH 7.0 and 25°C; log P_{ow} = 4.0 at pH 9.0 and 25°C.	Rodler, 1992d.
Hydrolysis (sterile solution):	[2-^{14}C-pyrimidine]cyprodinil. No hydrolysis in pH 5, 7 or 9 sterile buffers, in the dark at 1 mg/l for 32 days at 25°C.	Atkins, 1995
Hydrolysis (sterile solution):	[^{14}C-phenyl]cyprodinil. No hydrolysis in pH 4, 7 or 9 sterile deoxygenated buffers, in the dark at 2 mg/l for 5 days at 50°C.	Burri, 1992
Photolysis in water, unsensitized, 46 hours, in pH 7 buffer, λ 313 nm, cyprodinil at 1.4 mg/l, 20°C:	photolytic half-life in shallow waters: 17 days at 40°N in mid-summer; 28 days at 50°N in mid-springtime.	Abildt, 1994

[1/] Cyprodinil has 2 possible crystal forms. In the production process, the thermodynamically more stable modification is formed.

Technical material

Appearance:	fine powder with agglomerates	Rodler, 1992b
Colour:	beige	Rodler, 1992b
Odour:	weak odour	Rodler, 1992b

Metabolites CGA 249287 and CGA 275535

Hydrolysis (sterile solution)		[2-^{14}C-pyrimidine]CGA 249287. No hydrolysis in pH 4, 5, 7 or 9 sterile de-oxygenated buffers, in the dark at 2 mg/l for 5 days at 50°C.	Glänzel, 2001
Hydrolysis (sterile solution)		[2-^{14}C-pyrimidine]-CGA 275535. No hydrolysis in pH 4, 5, 7 or 9 sterile buffers, in the dark at 1 mg/l for 10 days at 50°C.	Morgenroth, 2001b

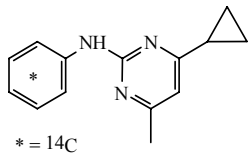
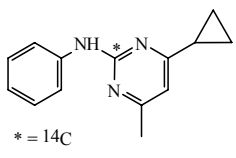
FORMULATIONS

Cyprodinil is available in the following formulations: WG 250 (with difenoconazole), WG 375 (with fludioxonil), WG 400 (with cyproconazole), WG 500, WG 750, EC 187.5 (with fenpropidin), EC 240 (with propiconazole), EC 250 (with propiconazole).

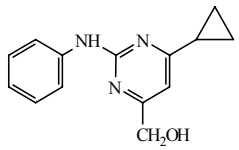
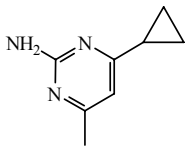
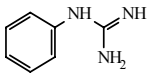
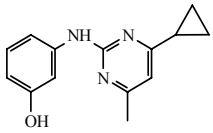
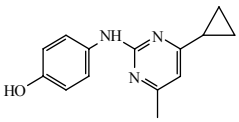
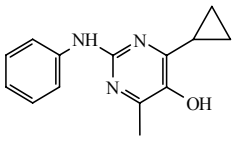
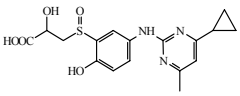
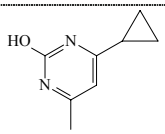
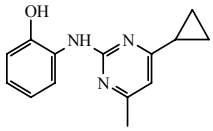
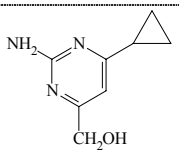
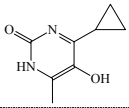
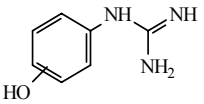
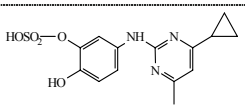
Formulation stability: when stored in an unopened original container (box with inner bag of paper/PE-laminate as water vapour barrier) away from direct sunlight, the WG 600 g/kg formulation has a shelf-life in temperate climates (18-22ºC) of at least 3 years; in hot climates (23-27ºC) of at least 2 years (Rodler, 1996).

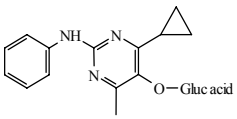
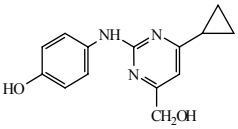
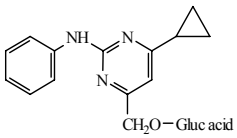
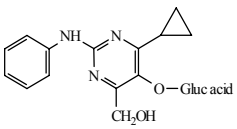
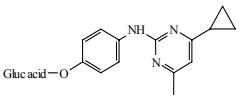
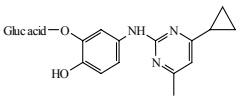
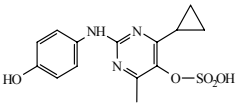
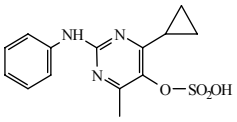
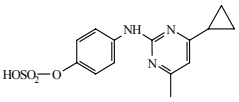
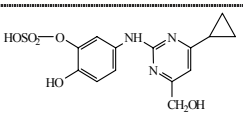
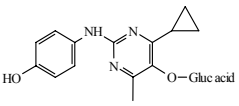
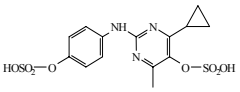
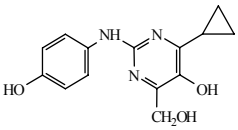
METABOLISM

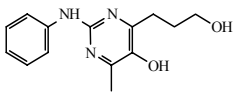
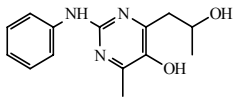
Cyprodinil, ^{14}C-labelled in the phenyl ring or at C2 of the pyrimidine ring, was used in the metabolism studies:

 * = ^{14}C	 * = ^{14}C
[U-^{14}C-phenyl]cyprodinil	[2-^{14}C-pyrimidine]cyprodinil

Structures, names and codes for metabolites are summarized below.

CGA 232449 (6-cyclopropyl-2-phenylaminopyrimidin-4-yl)methanol CAS No. 121552-66-7	
CGA 249287 4-cyclopropyl-6-methylpyrimidin-2-ylamine CAS No. 92238-61-4	
CGA 263208 phenyl-1-guanidine CAS No. 2002-16-6, named in study reports as phenylguanidine	
CGA 275535 3-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol, named in study reports as *N*-(3-hydroxyphenyl)-4-cyclopropyl-6-methyl-2-pyrimidinamine	
CGA 304075 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol CAS No. 195157-66-5	
CGA 304076 (Metab 1f) 4-cyclopropyl-6-methyl-2-phenylaminopyrimidin-5-ol	
CGA 321186 3-[5-(4-cyclopropyl-6-methyl-pyrimidin-2-ylamino)-2-hydroxy-phenylsulfinyl]-2-hydroxypropionic acid	
CGA 321915 4-cyclopropyl-6-methylpyrimidin-2-ol CAS No. 121553-48-8	
NOA-413167 (*ortho*-hydroxy-cyprodinil) 2-(4-cyclopropyl-6-methylpyrimidine-2-ylamino)phenol	
NOA 422054 (2-amino-6-cyclopropylpyrimidin-4-yl)methanol	
NOA 436942 4-cyclopropyl-6-methylpyrimidin-2,5-diol	
Metab L1 guanidinophenol, named in reports as *N*-hydroxyphenylguanidine	
Metab L2 2-sulfate conjugate of 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)benzene-1,2-diol	

Metab L3a glucuronic acid conjugate of 4-cyclopropyl-6-methyl-2-phenylaminopyrimidin-5-ol	
Metab L3b 6-cyclopropyl-2-(4-hydroxyphenylamino)pyrimidin-4-ylmethanol named in study reports as 4-cyclopropyl-2-(4-hydroxy-phenylamino)-6-methylpyrimidin-5-ol	
Metab L3c glucuronic acid conjugate of (6-cyclopropyl-2-phenylaminopyrimidin-4-yl)methanol	
Metab L4 5-glucuronic acid conjugate of 6-cyclopropyl-4-hydroxymethyl-2-phenylaminopyrimidin-5-ol named in study reports as 5-glucuronic acid conjugate of 4-cyclopropyl-6-hydroxymethyl-2-phenylaminopyrimidin-5-ol	
Metab 1G glucuronic acid conjugate of 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol	
Metab 2G 2-glucuronic acid conjugate of 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)benzene-1,2-diol	
Metab 1U 5-sulfate conjugate of 4-cyclopropyl-2-(4-hydroxyphenylamino)-6-methylpyrimidin-5-ol	
Metab 2U sulfate conjugate of 4-cyclopropyl-6-methyl-2-phenylaminopyrimidin-5-ol	
Metab 3U sulfate conjugate of 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol	
Metab 4U 2-sulfate conjugate of 4-(6-cyclopropyl-4-hydroxymethylpyrimidin-2-ylamino)benzene-1,2-diol named in study reports as 2-sulfate conjugate of 4-(4-cyclopropyl-6-hydroxymethylpyrimidin-2-ylamino)benzene-1,2-diol	
Metab 5U 5-glucuronic acid conjugate of 4-cyclopropyl-2-(4-hydroxyphenylamino)-6-methylpyrimidin-5-ol	
Metab 6U disulfate conjugate of 4-cyclopropyl-2-(4-hydroxyphenylamino)-6-methylpyrimidin-5-ol named in study reports as bis-sulfate conjugate of 4-cyclopropyl-2-(4-hydroxyphenylamino)-6-methylpyrimidin-5-ol	
Metab 7U 6-cyclopropyl-4-hydroxymethyl-2-(4-hydroxyphenylamino)pyrimidin-5-ol named in study reports as 4-cyclopropyl-6-hydroxymethyl-2-(4-hydroxyphenylamino)pyrimidin-5-ol	

4-(3-hydroxypropyl)-6-methyl-2-phenylaminopyrimidin-5-ol or 2-anilino-4-(3-hydroxypropyl)-6-methylpyrimidin-5-ol named in study reports as *N*-phenyl-4-(3-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine	
4-(2-hydroxypropyl)-6-methyl-2-phenylaminopyrimidin-5-ol or 2-anilino-4-(2-hydroxypropyl)-6-methylpyrimidin-5-ol named in study reports as *N*-phenyl-4-(2-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine	

Animal metabolism

The Meeting received animal metabolism studies on rats, lactating goats and laying hens. The most common metabolic pathways in animals begin with hydroxylation of the methyl group or at position 5 on the pyrimidine ring or at position 4 on the phenyl ring. Typically the hydroxy compounds form sulfate or glucuronic acid conjugates, for elimination. Cleavage of the amino bridge was minor.

Rats

When rats were orally dosed once with [^{14}C-phenyl]cyprodinil, the radiolabel was rapidly absorbed and then tissue residues depleted, with an initial half-life of 2 hours and later with a 5-18 hours half-life (Müller, 1996). Almost all (92-97%) of the radiolabel was excreted within 48 hours, when rats were dosed with [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil (Thanei, 1992). Most of the radiolabel excretion was in the urine (48-68%) with 29-47% in the faeces. There was no evidence for metabolic cleavage of the C-N-C bridge. CGA 232449 was identified as a major metabolite in faeces.

Müller (1992) identified eleven metabolites in excreta of orally dosed rats: CGA 304075, CGA 304076, 1U, 2U, 3U, 4U, 5U, 6U, 7U, 1G and 2G. Rümbeli (1996) identified 15 metabolites in the tissues of orally dosed rats: kidney and liver, the metabolites 1U, 2U, 3U, 6U, 7U, 1G, L3a, L4, CGA 249287 and CG 304075, together with parent cyprodinil; liver only, the metabolites L1 and L3c; kidney only, the metabolites 4U, 5U and L2.

Goats

Lactating dairy goats, weighing 49, 54, 53 and 57 kg, were dosed orally once daily for 4 consecutive days, by gelatin capsule, with 0.2 mg/kg bw/day per day of [^{14}C-phenyl]cyprodinil (2 goats) and 0.19 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil (2 goats), equivalent to 8.0 and 8.9 ppm cyprodinil in the diet, respectively (Speirs, 1992b; Neumann, 1994b). A parallel high-dose study was conducted with 9.9 mg/kg bw/day per day of [^{14}C-phenyl]cyprodinil (2 goats) and 9.8 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil (2 goats), equivalent to 267 and 286 ppm cyprodinil in the diet, respectively.

Accountability and excretion were measured in 1 goat from each dose level-label combination, i.e. 4 goats. Accountability of ^{14}C was 74-78 % for the low doses and 86-88 % for the high doses. By the end of the study, 6 hours after the final dose, 56-58 % of the total administered ^{14}C had been excreted from the low dose animals (Table 1).

Table 1. Accountability and excretion of ^{14}C from goats subjected to 4 days of oral daily dosing with labelled cyprodinil (Speirs, 1992b).

	% of total administered dose			
	low dose		high dose	
	[^{14}C-phenyl]	[2-^{14}C-pyrimidine]	[^{14}C-phenyl]	[2-^{14}C-pyrimidine]
^{14}C accountability	78%	74%	88%	86%
Excretion, urine	39%	27%	29%	27%
Excretion, faeces	19%	29%	47%	40%
Excretion, milk	0.13%	0.53%	0.38%	0.17%

Table 2. Distribution of ^{14}C in tissues and milk of goats dosed orally for 4 consecutive days, by gelatin capsule, with 0.2 mg/kg bw/day per day of [^{14}C-phenyl]cyprodinil and 0.19 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil, equivalent to 8.0 and 8.9 ppm cyprodinil in the diet, respectively (Neumann, 1994b).

Substrate	^{14}C as cyprodinil, mg/kg	
	[^{14}C-phenyl]cyprodinil	[2-^{14}C-pyrimidine]cyprodinil
Muscle	0.007	0.006
Omental fat	0.006	0.007
Renal fat	0.010	0.006
Subcutaneous fat	0.006	0.060
Liver	0.17	0.28
Kidney	0.23	0.22
Milk 0-24 h	0.011	0.065
Milk 44-48 h	0.011	0.033
Milk 48-72 h	0.016	0.044
Milk 72-78 h	0.020	0.062

Table 3. Metabolite identification in tissues and milk of goats dosed orally for 4 consecutive days, by gelatin capsule, with 0.2 mg/kg bw/day per day of [^{14}C-phenyl]cyprodinil and 0.19 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil, equivalent to 8.0 and 8.9 ppm cyprodinil in the diet, respectively (Neumann, 1994b).

Metabolite	Concentration, mg/kg, as cyprodinil					
	Milk 0-78 h		Kidney		Liver	
	^{14}C-phenyl	^{14}C-pyrimidine	^{14}C-phenyl	^{14}C-pyrimidine	^{14}C-phenyl	^{14}C-pyrimidine
Total radiolabel	0.015	0.048	0.234	0.216	0.172	0.277
Cyprodinil					0.003	0.016
CGA 304075			0.041	0.038		
CGA 304075 conj, 1G	0.002	0.013				
CGA 304075 conj, 3U	<0.001	0.001	0.003	0.015		0.006
CGA 304076 conj, 2U	0.003	0.006	0.013	0.017	0.004	0.008
CGA 249287		0.001		0.013		0.012
Unresolved	0.003	0.007	0.038	0.058	0.077	0.113
Non-extracted	0.004	0.007	0.029	0.026	0.070	0.093
Unidentified [1/]	0.002	0.012	0.040	0.011	0.015	0.003

[1/] Unidentified material, other than unresolved and non-extracted components.

Lactating dairy goats, weighing 40 and 42 kg, were dosed orally, directly into the rumen, once daily for 4 consecutive days, by gelatin capsule, with [^{14}C-phenyl]cyprodinil at 4.1 mg/kg bw, equivalent to 100 ppm cyprodinil in the diet (Rümbeli, 1997). Feed consumption was 1.7 kg (dry weight)/day. Milk was collected twice daily and the animals were slaughtered 6 hours after the final dose, for tissue collection. Accountability of the ^{14}C dose was 96-97%.

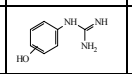
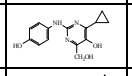
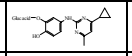
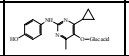
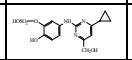
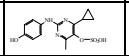
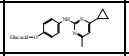
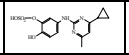
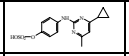
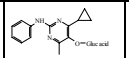
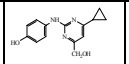
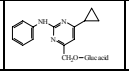
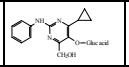
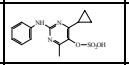
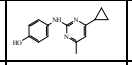
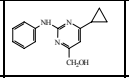
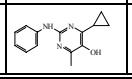
The distribution of the ^{14}C label is shown in Table 4, with the identified metabolites shown in Table 5. Most of the metabolites were products of hydroxylation at the 4-position in the phenyl ring, the 5-position in the pyrimidine ring and at the methyl group, which were then conjugated with glucuronic acid or sulfate. Cyprodinil parent was the major component of the residue in fat. No cyprodinil was detected in milk but 57 % of the residue in milk was accounted for by metabolite CGA 304075 and its glucuronic acid and sulfate conjugates.

Table 4. Distribution of ^{14}C in tissues and milk of goats dosed orally for 4 consecutive days, by gelatin capsule, with [^{14}C-phenyl]cyprodinil, equivalent to 100 ppm cyprodinil in the diet (Rümbeli, 1997).

Tissues, GIT and excreta	^{14}C as cyprodinil, mg/kg	% of dose
Leg muscle	0.052	0.041
Tenderloin	0.055	0.002
Omental fat	0.076	0.011
Perirenal fat	0.073	0.005
Kidneys	2.9	0.053
Liver	2.5	0.26

Tissues, GIT and excreta	^{14}C as cyprodinil, mg/kg	% of dose
GIT/rumen		21.5
Total eliminated		74.3

Table 5. Metabolite identification in tissues and milk of goats dosed orally for 4 consecutive days by gelatin capsule with [^{14}C-phenyl]cyprodinil equivalent to 100 ppm cyprodinil in the diet (Rümbeli, 1997).

Residue component		Concentration, mg/kg, as cyprodinil				
		muscle	fat	liver	kidneys	milk
Total radiolabel		0.052	0.075	2.5	2.9	0.71
Cyprodinil		0.001	0.051	0.23		
Metab L1				0.14		
Metab 7U			0.001	0.044		0.026
Metab 2G						0.027
Metab 5U			0.001			
Metab 4U				0.042		
Metab 1U		0.001		0.057	0.16	0.013
Metab 1G		0.003		0.088	0.13	0.39
Metab L2				0.040		0.011
Metab 3U				0.029	0.17	0.015
Metab L3a		0.001		0.14	0.31	0.029
Metab L3b		0.001		0.12		
Metab L3c		0.002		0.092		0.007
Metab L4				0.079		
Metab 2U		0.002	0.001	0.16	0.30	0.11
CGA 304075		0.008	0.002	0.75	1.1	
CGA 232449				0.23	0.35	
CGA 304076				0.023	0.21	

Hens

Laying White Leghorn hens (body weights 1.5 kg) were dosed orally once daily for 4 consecutive days, by gelatin capsule, at the equivalent of 0.4 mg/kg bw of [^{14}C-phenyl]cyprodinil (2 hens) and 0.4 mg/kg bw of [2-^{14}C-pyrimidine]cyprodinil (2 hens), equivalent to 4.7 and 4.5 ppm cyprodinil in the diet, respectively (Neumann, 1994a, Speirs, 1992a). A parallel high-dose study was conducted with 18.9 mg/kg bw/day per day of [^{14}C-phenyl]cyprodinil (2 hens) and 19.2 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil (2 hens), equivalent to 215 and 226 ppm cyprodinil in the diet, respectively. Daily feed consumption was approximately 130 g/bird.

Radiolabel was present at higher levels in the liver and kidney than in other tissues or eggs (Table 6). In the low dose experiment, ^{14}C accountability was 94 and 98 %. Elimination of the ^{14}C was rapid,

with 98% and 2% of the daily dose recovered in excreta and cage wash, respectively, in the first 24 hours.

The nature of the radiolabel in the eggs and tissues is summarized in Table 7. The ^{14}C level in meat was too low for identification. The nature of the residue in skin and fat was also not further examined. Cyprodinil was not detected in liver, the tissue with the highest level of ^{14}C. The main identified components of the liver residue were metabolites 1G and 3U, which are glucuronic acid and sulfate conjugates of CGA 304075. Cyprodinil was present at low levels in eggs from the high dose experiment.

Table 6. Distribution of ^{14}C in tissues and eggs of hens dosed orally for 4 consecutive days by gelatin capsule with [^{14}C-phenyl]cyprodinil and [2-^{14}C-pyrimidine]cyprodinil (Neumann, 1994a, Speirs, 1992a).

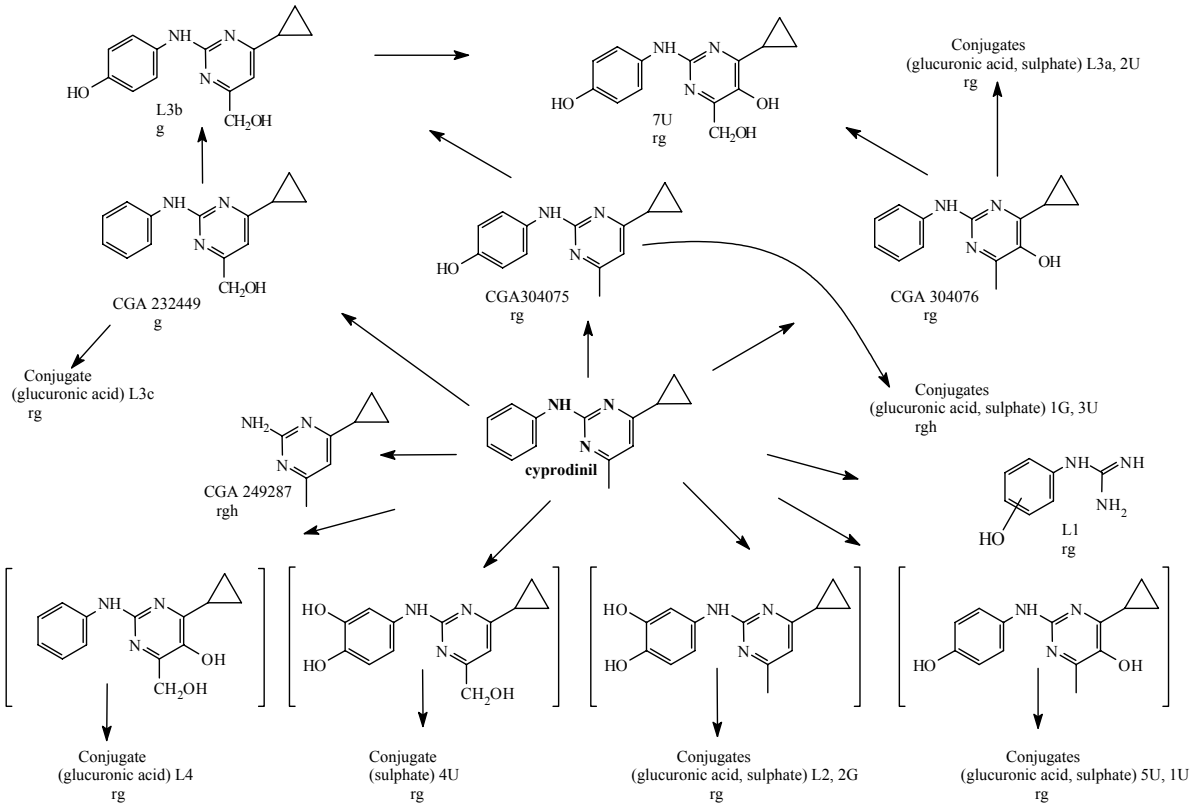
Tissue or egg	Hours after initial dose	^{14}C, expressed as cyprodinil, mean of group			
		[^{14}C-phenyl]cyprodinil		[2-^{14}C-pyrimidine]cyprodinil	
		4.7 ppm diet	215 ppm diet	4.5 ppm diet	226 ppm diet
Lean meat	78	0.002	0.066	0.003	0.092
Skin	78	0.009	0.69	0.009	0.89
Fat, peritoneal	78	0.008	1.2	0.010	1.6
Liver	78	0.12	5.6	0.096	5.5
Kidney	78	0.043	2.4	0.041	2.9
Egg white	0-24	0	0	0	0.007
Egg white	24-48	0	0.018	0	0.024
Egg white	48-72	0.001	0.018	0	0.031
Egg white	72-78	no egg	0.023	0	0.035
Egg yolk	0-24	0	0	0	0.009
Egg yolk	24-48	0.001	0.042	0.001	0.089
Egg yolk	48-72	0.004	0.18	0.003	0.28
Egg yolk	72-78	no egg	0.29	0.005	0.53

Table 7. Metabolite identification in tissues and eggs of hens dosed orally for 4 consecutive days, by gelatin capsule, with [^{14}C-phenyl]cyprodinil and [2-^{14}C-pyrimidine]cyprodinil (Neumann, 1994a, Speirs, 1992a). Egg white and egg yolk were from hens on the high dose (215 and 226 ppm) diets, while kidney and liver were from hens on the low dose (4.7 and 4.5 ppm) diets.

Residue component	Concentration, mg/kg, as cyprodinil							
	Egg white		Egg yolk		Kidney		Liver	
	^{14}C-phenyl	^{14}C-pyrimidine	^{14}C-phenyl	^{14}C-pyrimidine	^{14}C-phenyl	^{14}C-pyrimidine	^{14}C-phenyl	^{14}C-pyrimidine
Total radiolabel	0.016	0.022	0.14	0.18	0.043	0.041	0.12	0.096
Cyprodinil	0.002	0.003	0.011	0.003	0.001	-	-	-
CGA 304075 conj, 1G	-	-	0.011	0.012	0.001	0.001	0.005	0.007
CGA 304075 conj, 3U	0.001	0.002	0.022	0.034	0.007	0.009	0.007	0.010
CGA 249287	-	-	-	0.011	-	<0.001	-	0.003
Unresolved	0.007	0.009	0.037	0.066	0.004	0.006	0.040	0.022
Non-extracted	0.005	0.004	0.037	0.039	0.028	0.021	0.057	0.037
Unidentified [1/]	0.001	0.002	0.009	0.019	<0.001	<0.001	0.004	0.009

[1/] material, other than unresolved and non-extracted components.

Figure 1. Cyprodinil animal metabolism, proposed pathways (r = rat, g= goat, h = hen).



Plant metabolism

The Meeting received plant metabolism studies on wheat, apples, peaches, tomatoes and potatoes. Cyprodinil parent was quite persistent and was generally the major identifiable component of residues. Cleavage of the amino bridge was a minor route in plant metabolism. Cyprodinil was slowly absorbed into plant tissues, where it was hydroxylated and conjugated with sugars. In apples, much of the residue remained in the peel.

Wheat

Wheat plants were treated with [2-^{14}C-pyrimidine]cyprodinil, at 0.75 kg ai/ha at the 6-8 leaf stage and again at the panicle emergence stage at 0.5 kg ai/ha (Gross, 1992b). Radiolabel ^{14}C levels at harvest were: grain 0.11 mg/kg, husks 4.6 mg/kg and straw 15 mg/kg. Levels of parent cyprodinil were: grain 0.018 mg/kg, husks 0.37 mg/kg and straw 0.60 mg/kg (Table 8). Cyprodinil was the major identifiable component of the residue.

The pattern of extractable metabolites from [2-^{14}C-pyrimidine]cyprodinil in wheat straw was generally similar to the pattern from metabolism of [^{14}C-phenyl]cyprodinil, demonstrating that the amino bridge was mostly intact. The pattern was altered by hydrolysis with cellulase or 1N HCl, suggesting the presence of *O*- and *N*-sugar conjugates.

Wheat plants in the field were treated with [^{14}C-phenyl]cyprodinil at 0.75 kg ai/ha, at the 6-8 leaf stage and again at panicle emergence stage at 0.5 kg ai/ha (Gross, 1992a). Wheat plants at the 5-leaf stage were also treated once with [^{14}C-phenyl]cyprodinil at a rate of 0.75 kg ai/ha in a greenhouse experiment. In the field experiment, radiolabel ^{14}C levels at harvest were: grain 0.22 mg/kg, husks 8.2 mg/kg and straw 15 mg/kg. Levels of parent cyprodinil were: grain 0.022 mg/kg, husks 0.44 mg/kg and straw 0.44 mg/kg (Table 9). Cyprodinil was the major identifiable component of the residue. The greenhouse experiment demonstrated: a half-life of approximately 25 days for parent cyprodinil in the wheat plant; approximately 50% loss of radiolabel in 35 days by volatility; slow but continued uptake of cyprodinil; and very little translocation to new growth.

Gross (1997) further examined the non-extractable radiolabel in the wheat straw, from both the [2-^{14}C-pyrimidine]cyprodinil and [^{14}C-phenyl]cyprodinil experiments, and concluded that more than 30% of the radiolabel in straw was associated with lignin.

Table 8. Fate of [2-^{14}C-pyrimidine]cyprodinil after treatment of wheat plants, at 0.75 kg ai/ha at the 6-8 leaf stage and at the panicle emergence stage at 0.5 kg ai/ha (Gross, 1992b).

Interval, days	Radiolabel ^{14}C expressed as cyprodinil, mg/kg			Parent cyprodinil, mg/kg			Non-extracted radiolabel, % of total ^{14}C in the tissue		
0	shoots 11.9			shoots 11.2			shoots 0.8		
22	stalks 7.5	ears 4.0		stalks 5.3	ears 3.4		stalks 10	ears 1.6	
41	stalks 5.3	husks 4.6	grain 0.097	stalks 0.56	husks 0.42	grain na	stalks 33	husks 38	grain 24
65	straw 15	husks 6.8	grain 0.11	straw 0.60	husks 0.37	grain 0.018	straw 45	husks 49	grain 45

na = not analyzed.

Table 9. Fate of [^{14}C-phenyl]cyprodinil after treatment of wheat plants, at 0.75 kg ai/ha at the 6-8 leaf stage and at the panicle emergence stage at 0.5 kg ai/ha (Gross, 1992a).

Interval, days	Radiolabel ^{14}C expressed as cyprodinil, mg/kg			Parent cyprodinil, mg/kg			Non-extracted radiolabel, % of total ^{14}C in the tissue		
0	shoots 6.7			shoots 6.2			shoots 0.4		
22	stalks 9.1	ears 4.5		stalks 6.9	ears 4.5		stalks 6.1	ears 1.8	
41	stalks 4.5	husks 9.1	grain 0.16	stalks 0.53	husks 0.87	grain na	stalks 36	husks 36	grain 34
63	straw 15	husks 8.2	grain 0.22	straw 0.44	husks 0.44	grain 0.022	straw 48	husks 48	grain 58

na = not analyzed.

Gross (1994) further investigated the nature of the metabolites in straw, husks and grain from the [2-^{14}C-pyrimidine]cyprodinil metabolism. Various sugar conjugates were identified but substantial proportions of the radiolabel were unidentified and unextracted (Table 10). Cyprodinil was the major identified compound in wheat grain.

Table 10. Identification of metabolites resulting from [2-^{14}C-pyrimidine]cyprodinil treatment of wheat plants (Gross, 1994).

Metabolite		Straw	Husks	Grain
	Total radiolabel	14.9 mg/kg	6.8 mg/kg	0.11 mg/kg
	Identity/character	% of total	% of total	% of total
Metab I2	mixture of sugar conj. of CGA 321186 + three hydroxy-compounds	6.7	6.7	unresolved
Metab I7/8	CGA 321186	7.7	2.5	nd
Metab I9	sugar conj. of CGA 304075 or CGA 275535	1.8	0.8	unresolved
Metab I10	sugar conj. of CGA 263208	2.8	0.5	unresolved
Metab I11	CGA 263208	1.5	1.5	2.6
Metab I12	sugar conj. of CGA 304076	0.9	0.3	nd
Metab II1A	co-chromatographed with CGA 321915	2.0	nd	nd
Metab II2	co-chromatographed with CGA 249287	4.9	0.8	1.6
Metab II3	co-chromatographed with CGA 232449	0.2	unresolved	unresolved
Metab II4	co-chromatographed with CGA 275535 and CGA 304075	1.6	unresolved	unresolved
II5	cyprodinil	6.7	5.4	20
^{14}C-glucose		na	na	15
Unidentified		33	17	31
Unresolved		18	14	9
Non-extracted		12	49	6.3

nd = not detected; na = not analyzed.

Peaches

Branches of peach trees were sprayed with either [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil, at 0.27 (×1) and 2.7 kg ai/ha (×10). The schedule was 4 applications, beginning 21 days before harvest, at 7-day intervals, the last being at 1 day PHI (Kennedy, 1997). Cyprodinil constituted the major part of the residue (Table 11). Metabolites were mostly sugar conjugates of hydroxylated cyprodinil. The presence of low levels of CGA 249287 showed the occurrence of limited amino bridge cleavage.

Table 11. Distribution and identity of residues from spraying peach trees with either [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil at 0.27 (×1) and 2.7 kg ai/ha (×10) (Kennedy, 1997).

Residue component	^{14}C radiolabel, mg/kg, expressed as cyprodinil							
	Fruit				Leaf			
	×1 phenyl	×1 pyrimidine	×10 phenyl	×10 pyrimidine	×1 phenyl	×1 pyrimidine	×10 phenyl	×10 pyrimidine
Total radiolabel	0.50	0.92	6.5	6.2	18	25	170	199
Cyprodinil	0.37	0.83	5.3	6.0	14	25	152	160
CGA 249287	nd	0.008	nd	0.037	nd	0.25	nd	0.80
Glucose conj. of *ortho*-hydroxy-cyprodinil	0.005	0.011	0.059	0.044	1.3	1.7	7.7	9.7
Sugar conj's of *ortho*-hydroxy-cyprodinil and CGA 304076	0.013	0.023	0.11	0.11	1.1	1.2	6.5	8.8
Sugar conj's of CGA 304075	0.002	0.003	0.020	0.019	0.14	0.075	<0.17	1.2
Unknown + unresolved	0.049	0.029	0.35	0.11	1.9	0.55	13	4.0

Tomatoes

Greenhouse tomato plants were treated twice, 28 days apart with the first treatment 10.5 weeks after sowing, with [2-^{14}C-pyrimidine]cyprodinil at 0.75 kg ai/ha (Neumann, 1992b). Leaves and fruit were harvested 14 days after the second treatment, for examination of the residue (Table 12). CGA 232449 was identified as a metabolite in the fruit, at 2.5% of the total residue. After cellulase treatment to break down the conjugates, the following compounds were identified as components of the residue in the fruit: CGA 304076 (1.4 % of total), CGA 232449 (13 % of total) and CGA 304075 (2.8 % of total). Hydroxylation at various positions, followed by conjugation with sugars, is the main metabolic pathway. Cyprodinil was the major component of the residue.

Greenhouse tomato plants were treated with [^{14}C-phenyl]cyprodinil, in an experiment analogous to that described for [2-^{14}C-pyrimidine]cyprodinil (Neumann, 1992a). The metabolite pattern was very similar in the two experiments, showing that the amino bridge had remained intact.

Table 12. Distribution of residues in tomato fruits and foliage 14 days after the second treatment with [^{14}C]cyprodinil at 0.75 kg ai/ha (Neumann, 1992a and 1992b).

	Radiolabel, total ^{14}C, mg/kg, expressed as cyprodinil	Cyprodinil, mg/kg	% Residue on surface	% Residue penetrated into tissue
Treatment with [2-^{14}C-pyrimidine]cyprodinil				
Fruits	5.0	3.1	20	81
Foliage	73	51	not detected	101
Treatment with [^{14}C-phenyl]cyprodinil				
Fruits	6.7	3.7	20	79
Foliage	112	75	not detected	93

Potatoes

Greenhouse grown potato plants were treated 3 times with foliar sprays of [^{14}C-phenyl]cyprodinil at a rate equivalent to 0.56 kg ai/ha, 45 days after planting and then at 18- and 20-day intervals (Nicollier, 1996b). Foliage, tubers and soil were sampled for analysis. In a parallel experiment, greenhouse grown potato plants were treated 3 times with foliar sprays of [2-^{14}C-pyrimidine]cyprodinil with the same application rate and timing (Nicollier, 1996a). Levels of ^{14}C in leaves and tubers are summarized in Table 13.

In the tubers, at harvest, phenylguanidine (CGA 263208) was identified as a metabolite, at 0.004 and 0.005 mg/kg. Also in the tubers, metabolites were identified in which the cyclopropyl ring had been opened. Sum total levels of the two compounds, *N*-phenyl-4-(3-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine and *N*-phenyl-4-(2-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine, and their *O*-sugar conjugates were 0.015 and 0.018 mg/kg in the two labelling experiments. A portion of the ^{14}C in potatoes (24% from the phenyl label experiment and 13% from the pyrimidine label experiment) was identified as being incorporated into glucose.

A number of metabolites and parent cyprodinil were identified (or tentatively identified by chromatography) in potato foliage at harvest: a sugar conjugate of CGA 232449, a sugar conjugate of CGA 304076, CGA 263208, CGA 304075, CGA 275535 and CGA 232449. In the soil, at harvest, cyprodinil (0.32 mg/kg) and CGA 263208 (0.008 mg/kg) were identified.

Table 13. Distribution of residues in potato tubers and foliage, 1 hour and 14 days after the third treatment with [^{14}C]cyprodinil at 0.56 kg ai/ha (Nicollier, 1996a and 1996b).

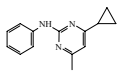
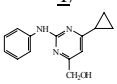
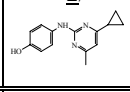
	Radiolabel, total ^{14}C, mg/kg, expressed as cyprodinil	Cyprodinil, mg/kg	% extractable ^{14}C	% non-extractable ^{14}C
Treatment with [2-^{14}C-pyrimidine]cyprodinil				
leaves, 1 hour	65	55	108	4.0
tubers, 1 hour	0.045	nd	80	27
foliage, 14 days	26	12	91	9.8
potato peel, 14 days	0.093	nd	59	31
potato flesh, 14 days	0.065	nd	71	33
whole potato	0.069			
Treatment with [^{14}C-phenyl]cyprodinil				
leaves, 1 hour	26	18	99	4.1
tubers, 1 hour	0.057	0.011	62	46
foliage, 14 days	25	12	98	10
potato peel, 14 days	0.092	nd	45	48
potato flesh, 14 days	0.091	nd	39	57
whole potato	0.091			

nd = not detected (<0.002 mg/kg).

Apples

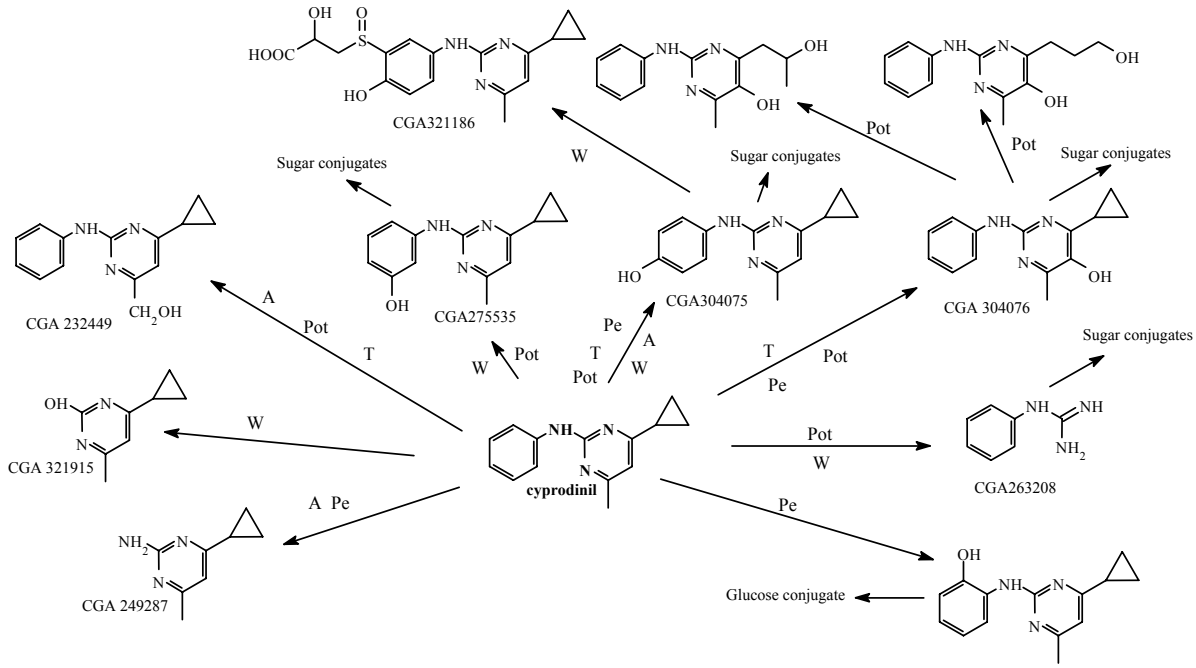
Golden Delicious apple trees, growing in containers, were sprayed 3 times at intervals of 8 and 5 weeks with [2-^{14}C-pyrimidine]cyprodinil at a spray concentration of 0.050 kg ai/hl, corresponding to 75 mg cyprodinil per tree (Stingelin, 1993). The trees were placed in an assigned field plot, in Switzerland, for the experiment. Leaf samples were taken on a number of occasions and fruit were taken at maturity, 61 days after the final treatment, for analysis. Levels of ^{14}C in leaves taken immediately after the three treatments were 158, 130 and 139 mg/kg, respectively, with 93, 86 and 69% as surface residues. Of the radiolabel in whole fruit, 16% was identified, 39% was unextracted and 36% was unidentified and unresolved. Parent cyprodinil was the major identified component of the residue.

Table 14. Fate of cyprodinil residues in apples after the trees were treated 3 times, at intervals of 8 and 5 weeks, with [2-^{14}C-pyrimidine]cyprodinil at a spray concentration of 0.050 kg ai/hl, corresponding to 75 mg cyprodinil per tree (Stingelin, 1993). Leaf and fruit samples were taken 61 days after the final treatment.

Plant part	Residues, expressed as cyprodinil, mg/kg						
	Total radiolabel	Surface residue	Penetrated residue	Cyprodinil 	CGA 232449 1/ 	CGA 304075 2/ 	CGA 249287 3/ 
Leaf	49	na	47	6.0	4.7	4.2	-
Peel	3.5	na	3.2	0.33	0.034	0.069	0.034
Pulp	0.17	na	0.16	0.019	0.003	0.0014	0.014
Whole fruit	0.80	0.021	0.72	0.088	0.0088	0.014	0.018

na = not analyzed.
1/ Present as a sugar conjugate, identified by chromatography after cellulase treatment.
2/ Present as a sugar conjugate, identified after cellulase treatment.
3/ Identified by chromatography.

Figure 2. Cyprodinil plant metabolism, proposed pathways (A = apple, Pe =peach, Pot = potato, T = tomato, W = wheat).



Environmental fate in soil

The Meeting received information on the behaviour and fate of cyprodinil during aerobic metabolism in a number of soils. At 20°C and moisture levels above 60 % field capacity, the initial half-life for loss of parent cyprodinil ranged from 11 to 46 days. Temperature and moisture levels strongly influenced the rate of disappearance, with longer half-lives at lower temperatures and moisture levels.

In soil metabolism CGA 249287 was an important metabolite, demonstrating that amino bridge cleavage occurs readily in soil. CGA 275535 was also an important metabolite. Parent cyprodinil and metabolite CGA 249287 are sufficiently persistent in soil that residues could still be present in the soil at harvest of a root crop.

Mamouni (1994) examined the effects of temperature, soil moisture level (as % field capacity) and pesticide concentration on the rate of disappearance of cyprodinil from a soil under aerobic conditions. Temperature and moisture levels had substantial effects but concentration had little effect. After 110 days, 9.2% and 40% of the cyprodinil dose remained after incubation at 20°C and 10°C, respectively, with conditions otherwise identical. After 110 days, 9.2% and 25% of the cyprodinil dose remained after incubation in soil at 60% and 30% field moisture capacity, respectively.

Aerobic soil metabolism studies are summarized below, showing the test conditions, the nature of the soils, estimated half-lives and the nature of identified soil metabolites.

Aerobic soil metabolism Ref: Concha, 1995a

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 3 mg/kg
Duration: 363 days Temp: 25.1°C average Moisture: 75% field capacity
Soil: sandy loam pH: 5.2 Organic matter: 1.2%
Half-life (parent): 22 days (day 0-21), 433 days (day 28-363)
% cyprodinil remaining, day 363 = 42% % mineralization, day 363 = 2.7%

Metabolites	Max (% of dose)	Day
CGA 249287	11%	363
CGA 275535	11%	7
CGA 304075	1.1%	270
CGA 304076	0.1%	363

Aerobic soil metabolism Ref: Concha, 1995b

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 3.2 mg/kg
Duration: 364 days Temp: 25.1°C Moisture: 75% field capacity
Soil: sandy loam pH: 5.2 Organic matter: 1.2%
Half-life (parent): 30 days (day 0-28), 600 days (day 59-364)
% cyprodinil remaining, day 364 = 33 % % mineralization, day 364 = 9.7 %

Metabolites	Max (% of dose)	Day
CGA 275535 + CGA 304075	12%	28

Aerobic soil metabolism Ref: Kitschmann, 1994a

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 1.5 mg/kg
Duration: 363 days Temp: 19.5°C av Moisture: 75% field capacity
Soil: silty loam pH: 7.3 Organic carbon: 2.3%
Half-life (parent): 28 days (day 0-63)
% cyprodinil remaining, day 363 = 5.5 % % mineralization, day 363 =25%
Metabolites: not identified

Aerobic soil metabolism Ref: Kitschmann, 1994b

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 3.1 mg/kg
Duration: 159 days Temp: 19.5°C av Moisture: 68% field capacity
Soil: loamy sand pH: 7.2 Organic carbon: 2.2%
Half-life (parent): 46 days (day 0-159)
% cyprodinil remaining, day 159 = 9.2 % % mineralization, day 154 = 16.5%
Metabolites: not identified

Aerobic soil metabolism Ref: Mamouni, 1994

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 1 mg/kg
Duration: 110 days Temp: 20°C Moisture: 60 % field capacity
Soil: silt loam pH: 7.7 Organic carbon: 1.4 %
Half-life (parent): 31 days
% cyprodinil remaining, day 110 = 9.2 % % mineralization, day 110 = 8.3 %
Metabolites: not identified

Aerobic soil metabolism Ref: Mamouni, 1994

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 1 mg/kg
Duration: 110 days Temp: 20°C Moisture: 30% field capacity
Soil: silt loam pH: 7.7 Organic carbon: 1.4%
Half-life (parent): 58 days
% cyprodinil remaining, day 110 = 25% % mineralization, day 110 = 6.8%
Metabolites: not identified

Aerobic soil metabolism Ref: Mamouni, 1994

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 1 mg/kg
Duration: 110 days Temp: 10°C Moisture: 60% field capacity
Soil: silt loam pH: 7.7 Organic carbon: 1.4%
Half-life (parent): 85 days
% cyprodinil remaining, day 110 = 40% % mineralization, day 110 = 2.6%
Metabolites: not identified

Aerobic soil metabolism Ref: Mamouni, 1994

Test material: [^{14}C-phenyl]cyprodinil Dose rate: 0.1 mg/kg
Duration: 110 days Temp: 20°C Moisture: 60% field capacity
Soil: silt loam pH: 7.7 Organic carbon: 1.4%
Half-life (parent): 11 days (day 0-21), 65 days (day 21-110)
% cyprodinil remaining, day 110 = 10% % mineralization, day 110 = 9.3%
Metabolites: not identified

Aerobic soil metabolism Ref: Schäffer, 1993

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 3.0 mg/kg
Duration: 180 days Temp: 20°C Moisture: 62% field capacity
Soil: loamy sand pH: 7.2 Organic carbon: 1.9%
Half life (parent): 29 days (day 0-45)
% cyprodinil remaining, day 180 = 4.8% % mineralization, day 180 = 13 %

Metabolites	Max (% of dose)	Day
CGA 249287	9.4%	45
CGA 321915	4.3%	122

Aerobic soil metabolism Ref: Schäffer, 1994

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 1.5 mg/kg
Duration: 139 days (soil incorp.) Temp: 20°C Moisture: 68% field capacity
Soil: loamy sand pH: 6.0 Organic carbon: 2.7%
Half life (parent): 36 days
% cyprodinil remaining, day 139 = 9.0% % mineralization, day 139 = 2.1%

Metabolites	Max (% of dose)	Day
CGA 249287	12%	63
CGA 321915	4.5%	111

Aerobic soil metabolism Ref: Schäffer, 1994

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 1.5 mg/kg
Duration: 182 days (surface applic.) Temp: 20°C Moisture: 68% field capacity
Soil: loamy sand pH: 6.0 Organic carbon: 2.7%
Half life (parent): 110 days
% cyprodinil remaining, day 182 = 28% % mineralization, day 182 = 4.7%

Metabolites	Max (% of dose)	Day
CGA 249287	14%	182
CGA 321915	4.6%	182

Aerobic soil metabolism Ref: Schäffer, 1994

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 1.5 mg/kg
Duration: 139 days (soil incorp.) Temp: 20°C Moisture: 58% field capacity
Soil: sandy loam pH: 7.4 Organic carbon: 1.1%
Half life (parent): 31 days
% cyprodinil remaining, day 139 = 5.1% % mineralization day 139 = 2.1%

Metabolites	Max (% of dose)	Day
CGA 249287	12%	63
CGA 321915	5.1%	139

Aerobic soil metabolism Ref: Schäffer, 1994

Test material: [2-^{14}C-pyrimidine]cyprodinil Dose rate: 1.5 mg/kg
Duration: 182 days (surface applic.) Temp: 20°C Moisture: 58% field capacity
Soil: sandy loam pH: 7.4 Organic carbon: 1.1%
Half life (parent): 41 days
% cyprodinil remaining day 182 = 4. % % mineralization day 182 = 4.7%

Metabolites	Max (% of dose)	Day
CGA 249287	7.4%	112
CGA 321915	4.0%	165

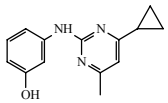
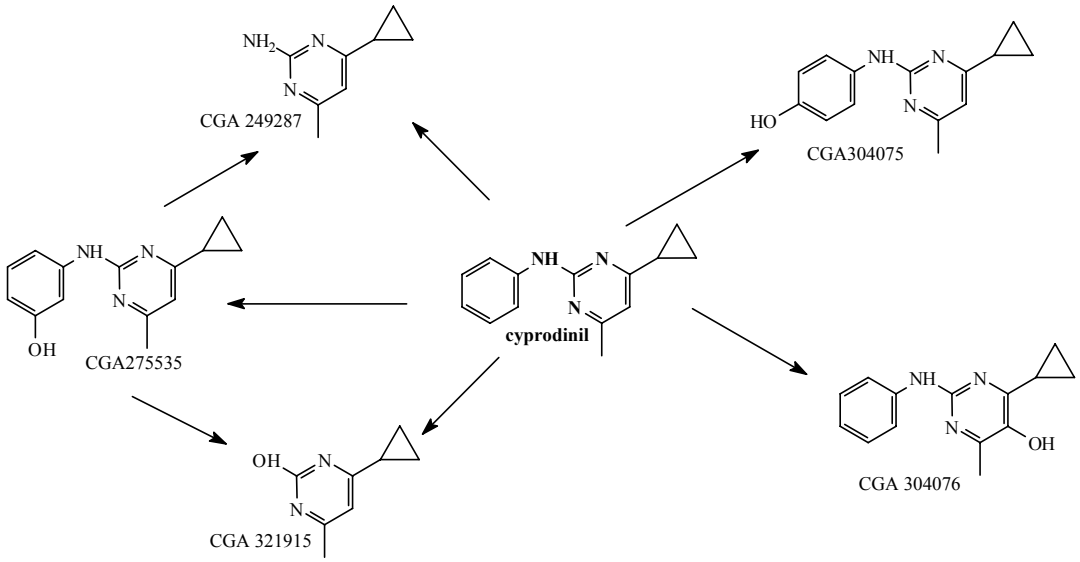
Aerobic soil metabolism			Ref: Völkel, 2001
Test material: [2-^{14}C-pyrimidine]CGA 275535 			Dose rate: 0.3 mg/kg
Duration: 120 days	Temp: 20°C		Moisture: above 40% max. water capacity
Soil: sandy loam	pH: 7.4		Organic carbon: 1.2%
Half life (CGA 275535), day 0-1: 0.7 days			
% CGA 275535 remaining, day 120 = 1.5%			% mineralization, day 120 = 15%
% non-extractables, day 120 = 62%			
Metabolites	Max (% of dose)	Day	
CGA 249287	9.8%	14	
CGA 321915	4.6%	14	
Aerobic soil metabolism			Ref: Völkel, 2001
Test material: [2-^{14}C-pyrimidine]CGA 275535			Dose rate: 0.3 mg/kg
Duration: 120 days	Temp: 20°C		Moisture: above 40% max water capacity
Soil: sandy loam	pH: 7.5		Organic carbon: 1.2%
Half life (CGA 275535), day 0-1: 0.4 days			
% CGA 275535 remaining, day 120 = 1.4%			% mineralization, day 120 = 13%
% non-extractables day 120 = 62 %			
Metabolites	Max (% of dose)	Day	
CGA 249287	7.5%	14	
CGA 321915	6.6%	14	
Aerobic soil metabolism			Ref: Völkel, 2001
Test material: [2-^{14}C-pyrimidine]CGA 275535			Dose rate: 0.3 mg/kg
Duration: 120 days	Temp: 20°C		Moisture: above 40% max water capacity
Soil: silt loam	pH: 5.8		Organic carbon: 0.99%
Half life (CGA 275535), day 0-1: 0.5 days			
% CGA 275535 remaining, day 120 = 1.5%			% mineralization, day 120 = 7.3%
% non-extractables, day 120 = 62%			
Metabolites	Max (% of dose)	Day	
CGA 249287	9.8%	14	
CGA 321915	4.6%	14	

Figure 3. Proposed pathways of cyprodinil metabolism in aerobic soil.



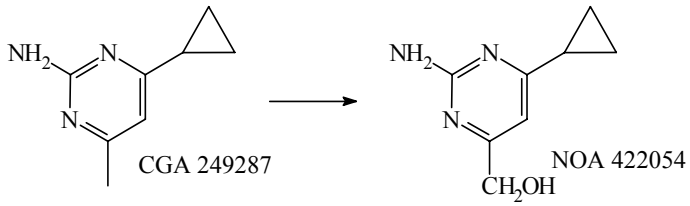
Crop rotation studies

The Meeting was provided with residue data from confined crop rotation trials, using [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil, and from crop rotation trials, using unlabelled

cyprodinil. In a number of cases, the spraying of bare ground was substituted as an extreme case for residues in the soil from the first crop. Residues of cyprodinil itself (at 0.02 mg/kg and lower) were detected in rotational crops, sown 1-12 months after the original treatment.

Kennedy (1999) showed that the ^{14}C levels in rotational crops, from the [2-^{14}C-pyrimidine]cyprodinil treatment, were substantially higher than from the [^{14}C-phenyl]cyprodinil treatments, particularly at the longer intervals. An important component of the residue at the longer intervals was identified as NOA 422054 ((2-amino-6-cyclopropyl-pyrimidin-4-yl)-methanol). It may result from plant uptake of soil metabolite CGA 249287 (4-cyclopropyl-6-methyl-pyrimidin-2-ylamine) and plant hydroxylation of the methyl group.

Figure 4. Proposed rotational crop metabolism of the soil metabolite, CGA 249287.



soil metabolite rotational crop plant metabolite

Metabolites resulting from hydroxylation of cyprodinil at various positions (CGA 304075, CGA 232449, CGA 304076 and NOA 413167) and metabolites resulting from cleavage of the amine bridge (CGA 263208, CGA 249287, NOA 422054 and CGA 321915) were detected in rotational crops. Metabolite NOA 422054 was unstable as a residue in radish roots, during storage in the freezer, so that radishes may not be an ideal choice as a rotational crop for studying the behaviour of this metabolite.

Table 15. Confined rotational crop studies.

First crop or application target country, year, ref.	Application			PHI [1]	Rotational crop	TSI [2]	THI [3]	Sample	^{14}C	Residues, cyprodinil
	Compound	Form	kg ai/ha	days		days	days			mg/kg
Spring wheat, Switzerland, 1990 Gross, 1992c	[^{14}C-phenyl]-cyprodinil	WP	0.75 + 0.50	41	lettuce	43	34	head	0.009	na
							53	head	0.004	
Spring wheat, Switzerland, 1990 [4] Gross, 1992c	[^{14}C-phenyl]-cyprodinil	WP	0.75 + 0.50	41	winter wheat	106	211	plant	0.001	na
							259	plant	0.001	na
							292	stalks	0.006	na
							292	grain	0.003	na
							292	husks	0.005	na
Spring wheat, Switzerland, 1990 Gross, 1992c	[^{14}C-phenyl]-cyprodinil	WP	0.75 + 0.50	41	sugar beet	272	93	tops	0.002	na
							93	roots	0.002	na
							126	tops	<0.001	na
							126	roots	0.002	na
							211	tops	<0.001	na
							211	roots	<0.001	na
Spring wheat, Switzerland, 1990 Gross, 1992c	[^{14}C-phenyl]-cyprodinil	WP	0.75 + 0.50	41	maize	302	63	plant	0.003	na
							96	plant	0.001	na
							181	stalks	0.005	na
							181	grain	0.002	na
							181	cobs	0.002	na
Spring wheat, Switzerland, 1990 [5] Gross, 1992d	[2-^{14}C-pyrimidine]-cyprodinil	WP	0.75 + 0.50	41	lettuce	43	34	head	0.017	na
							53	head	0.006	na
Spring wheat, Switzerland, 1990 Gross, 1992d	[2-^{14}C-pyrimidine]-cyprodinil	WP	0.75 + 0.50	41	winter wheat	106	211	plant	0.007	na
							259	plant	0.010	na
							292	stalks	0.036	<0.005
							292	grain	0.005	na
							292	husks	0.044	0.010

First crop or application target country, year, ref.	Application			PHI [1/]	Rotational crop	TSI [2/]	THI [3/]	Sample	^{14}C	Residues, cyprodinil
	Compound	Form	kg ai/ha	days		days	days			mg/kg
Spring wheat, Switzerland, 1990 Gross, 1992d	[2-^{14}C-pyrimidine]-cyprodinil	WP	0.75 + 0.50	41	sugar beet	272	93	tops	0.006	na
							93	roots	0.009	na
							126	tops	0.005	na
							126	roots	0.005	na
							211	tops	0.002	na
							211	roots	0.003	na
Spring wheat, Switzerland, 1990 Gross, 1992d	[2-^{14}C-pyrimidine]-cyprodinil	WP	0.75 + 0.50	41	maize	302	63	plant	0.011	na
							96	plant	0.004	na
							181	stalks	0.016	<0.005
							181	grain	0.002	na
							181	cobs	0.003	na
Bare ground application, USA (CA), 1996 Kennedy, 1999	[^{14}C-phenyl]-cyprodinil		3.2		wheat	29	87	forage	0.20	0.012
					wheat	29	133	forage	0.095	0.012
					wheat	29	232	fodder	0.38	0.004
					wheat	29	232	grain	0.11	na
					mustard	29	87	leaves	0.23	na
					radish	29	87	leaves	0.43	0.023
					radish	29	87	roots	0.56	0.062
Bare ground application, USA (CA), 1996 Kennedy, 1999	[^{14}C-phenyl]-cyprodinil		3.2		wheat	119	190	forage	0.35	0.019
					wheat	119	197	forage	0.29	0.005
					wheat	119	259	fodder	0.46	0.002
					wheat	119	259	grain	0.17	0.003
					mustard	119	231	leaves	0.11	na
					radish	119	199	leaves	0.19	0.002
					radish	119	199	roots	0.38	0.035
Bare ground application, USA (CA), 1996 Kennedy, 1999	[^{14}C-phenyl]-cyprodinil		3.2		mustard	32	102	leaves	0.34	0.011
					radish	32	102	leaves	0.43	na
					radish	32	102	roots	0.39	na
					mustard	120	175	leaves	0.26	0.020
Bare ground application, USA (CA), 1996 Kennedy, 1999	[^{14}C-phenyl]-cyprodinil		3.2		wheat	273	328	forage	0.040	0.001
					wheat	273	382	forage	0.017	<0.001
					wheat	273	498	fodder	0.071	na
					wheat	273	498	grain	0.031	na
					mustard	273	382	leaves	0.018	<0.001
					radish	273	382	leaves	0.033	0.001
					radish	273	382	roots	0.070	0.003
Bare ground application, USA (CA), 1996 Kennedy, 1999	[^{14}C-phenyl]-cyprodinil		3.2		wheat	366	414	forage	0.059	na
					wheat	366	438	forage	0.050	na
					wheat	366	626	fodder	0.10	na
					wheat	366	626	grain	0.039	na
					mustard	366	414	leaves	0.023	<0.001
					radish	366	414	leaves	0.074	0.002
					radish	366	414	roots	0.073	0.001
Bare ground application, USA (CA), 1996 Kennedy, 1999	[2-^{14}C-pyrimidine]-cyprodinil		3.2		wheat	29	87	forage	0.39	0.002
					wheat	29	133	forage	0.24	0.001
					wheat	29	232	fodder	2.8	0.007
					wheat	29	232	grain	0.14	na
					mustard	29	87	leaves	0.32	na
					radish	29	87	leaves	0.17	na
					radish	29	87	roots	0.48	na
Bare ground application, USA (CA), 1996 Kennedy, 1999	[2-^{14}C-pyrimidine]-cyprodinil		3.2		wheat	119	190	forage	1.9	0.004
					wheat	119	197	forage	1.9	na
					wheat	119	259	fodder	11.8	na
					wheat	119	259	grain	0.43	na
					mustard	119	231	leaves	0.94	na
					radish	119	199	leaves	1.7	na
					radish	119	199	roots	1.2	0.009
Bare ground application, USA (CA), 1996 Kennedy, 1999	[2-^{14}C-pyrimidine]-cyprodinil		3.2		mustard	32	102	leaves	2.1	na
					radish	32	102	leaves	1.5	na
					radish	32	102	roots	0.83	0.010
					mustard	120	175	leaves	2.8	na

First crop or application target country, year, ref.	Application			PHI [1] days	Rotational crop	TSI [2] days	THI [3] days	Sample	^{14}C	Residues, cyprodinil mg/kg
	Compound	Form	kg ai/ha							
Bare ground application, USA (CA), 1996 Kennedy, 1999	[2-^{14}C-pyrimidine]-cyprodinil		3.2		wheat	273	328	forage	0.57	0.004
					wheat	273	382	forage	0.11	na
					wheat	273	498	fodder	2.0	na
					wheat	273	498	grain	0.099	na
					mustard	273	382	leaves	0.088	0.001
					radish	273	382	leaves	0.12	na
					radish	273	382	roots	0.21	na
Bare ground application, USA (CA), 1996 Kennedy, 1999	[2-^{14}C-pyrimidine]-cyprodinil		3.2		wheat	366	414	forage	1.9	na
					wheat	366	438	forage	1.6	na
					wheat	366	626	fodder	5.5	na
					wheat	366	626	grain	0.15	na
					mustard	366	414	leaves	0.27	na
					radish	366	414	leaves	1.5	na
					radish	366	414	roots	0.35	na
Bare ground application, Switzerland, 1997 Stingelin, 2000	[2-^{14}C-pyrimidine]-cyprodinil	WG	1.3		lettuce	29	68	head	0.066	0.009
					lettuce	124	180	head	0.057	<0.001
					lettuce	365	418	head	0.025	<0.001
Bare ground application, Switzerland, 1997 Stingelin, 2000	[2-^{14}C-pyrimidine]-cyprodinil	WG	1.3		radish	29	68	tops	0.14	0.001
					radish	29	68	roots	0.034	0.003
					radish	124	180	tops	0.11	<0.001
					radish	124	180	roots	0.018	<0.001
					radish	365	418	tops	0.47	<0.001
					radish	365	418	roots	0.011	<0.001
Bare ground application, Switzerland, 1997 Stingelin, 2000	[2-^{14}C-pyrimidine]-cyprodinil	WG	1.3		spring wheat	29	68	tops	0.37	0.012
					spring wheat	29	119	straw	3.5	0.032
					spring wheat	29	119	grain	0.090	<0.001
					spring wheat	365	453	tops	0.15	0.003
					spring wheat	365	469	straw	0.48	0.001
					spring wheat	365	469	grain	0.025	na
					winter wheat	180	243	tops	0.12	<0.001
					winter wheat	180	418	tops	0.040	<0.001
					winter wheat	180	455	straw	0.22	<0.001
					winter wheat	180	455	grain	0.012	<0.001

na: not analyzed.

[1] PHI: pre-harvest interval of first crop, days.

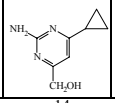
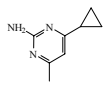
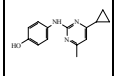
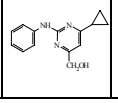
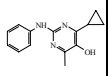
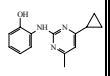
[2] TSI: interval between final treatment on first crop or spraying of bare ground and sowing of rotation crop, days.

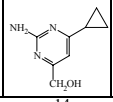
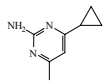
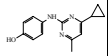
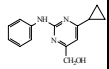
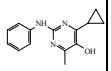
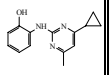
[3] THI: interval between final treatment on target crop or bare ground and sampling or harvest of rotation crop, days.

[4] The distribution and nature of the residue in the target crop, spring wheat, was provided in the metabolism report (Gross, 1992a).

[5] The distribution and nature of the residue in the target crop, spring wheat, was provided in the metabolism report (Gross, 1992b).

Table 16. Identified components of residues resulting from crop rotation studies with [^{14}C-phenyl]cyprodinil and [2-^{14}C-pyrimidine]cyprodinil. See Table 15 for radiolabel and cyprodinil levels in the rotational crops.

Commodity	TSI [1] days	THI [2] days	cyprodinil	CGA 263208 	NOA 422054 	CGA 249287 	CGA 304075 	CGA 232449 	CGA 304076 	NOA 413167 
			^{14}C levels expressed as cyprodinil							
[^{14}C-phenyl]cyprodinil (Kennedy, 1999)										
wheat forage	29	87	0.012	0.018				0.013	0.001	0.001
wheat forage	29	133	0.012				<0.001	0.007		
wheat fodder	29	232	0.004					0.028		
mustard leaf	32	102	0.011	0.063			0.002	0.025	0.002	0.001
radish leaf	29	87	0.023	0.061			0.006	0.024	0.002	0.003
radish root	29	87	0.062	0.043				0.034		0.007

Commodity	TSI [1/] days	THI [2/] days	cyprodinil	CGA 263208 	NOA 422054 	CGA 249287 	CGA 304075 	CGA 232449 	CGA 304076 	NOA 413167 
			^{14}C levels expressed as cyprodinil							
[2-^{14}C-pyrimidine]cyprodinil (Kennedy, 1999)										
wheat forage	29	87	0.002	0.027	0.067	0.009	0.002	0.003	0.002	0.002
wheat forage	29	133	0.001		0.022	0.009		0.002		
wheat fodder	29	232	0.007	0.064	0.30	0.095		0.016		
mustard leaf	32	102		0.20	0.68	0.077	0.058	0.020		
radish leaf	32	102			0.62	0.10		0.008		
radish root	32	102	0.010	0.054	0.29	0.029	0.007	0.015		
wheat forage	119	190	0.004		0.39	0.30		0.008		
wheat forage	119	197			0.36	0.13				
wheat fodder	119	259			1.5	0.48				
mustard leaf	120	175		0.38	0.86	0.19				
radish leaf	119	199		0.007	0.50	0.031				
radish root	119	199	0.009		0.25	0.039				
wheat forage	273	328	0.004		0.090	0.023				
wheat forage	273	382			0.012	0.006				
wheat fodder	273	498		0.057	0.13	0.065				
mustard leaf	273	382	0.001		0.021	0.003				
radish leaf	273	382			0.028	0.005				
radish root	273	382		0.023	0.067	0.011				
wheat forage	366	414			0.18	0.088				
wheat forage	366	438			0.21	0.11				
wheat fodder	366	626			0.13	0.18				
radish roots	366	414			0.11	0.016				
[2-^{14}C-pyrimidine]cyprodinil (Stingelin, 2000)							CGA 321915	mixture [3/]		
lettuce heads	29	68	0.009	0.003	<0.001	0.001	0.002	0.018		
lettuce heads	124	180	<0.001	<0.001	0.007	0.001	0.013	0.003		
lettuce heads	365	418	<0.001	<0.001	<0.001	0.001	0.005	0.007		
radish tops	29	68	0.001	0.013	0.010	<0.001	0.003	0.057		
radish roots	29	68	0.003	0.002	0.001	0.004	<0.001	0.004		
radish tops	124	180	<0.001	0.002	0.003	<0.001	0.012	0.047		
radish roots	124	180	<0.001	<0.001	<0.001	0.001	0.001	0.003		
radish tops	365	418	<0.001	0.003	<0.001	0.001	0.008	0.016		
radish roots	365	418	<0.001	<0.001	<0.001	0.003	<0.001	0.001		
s wheat tops [4/]	29	68	0.012	0.014	<0.001	0.007	0.006	0.10		
s wheat straw	29	119	0.032	0.084	0.14	0.28	0.066	0.56		
s wheat grain	29	119	<0.001	<0.001	0.002	<0.001	0.001	0.016		
s wheat tops	365	453	0.003	0.006	0.004	0.008	0.020	0.041		
s wheat straw	365	459	0.001	0.022		0.058	0.044	0.071		
s wheat grain	365	459	na	na	na	na	na	na		
w wheat tops [4/]	180	243	<0.001	0.009	0.004	0.003	0.049	0.025		
w wheat tops	180	418	<0.001	0.001	<0.001	0.001	0.007	0.010		
w wheat straw	180	455	<0.001	0.007	0.016	0.009	0.029	0.038		
w wheat grain	180	455	<0.001	<0.001	<0.001	0.001	<0.01	<0.001		

na: not analyzed.

[1/] TSI: interval between treatment on bare ground and sowing of second crop, days.

[2/] THI: interval between treatment on bare ground and sampling or harvest of rotation crop, days.

[3/] Mixture of guanidine, NOA 422054 sugar conjugate and NOA 436942 *N*-glucose conjugate.

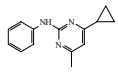
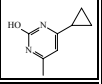
[4/] s wheat: summer wheat; w wheat: winter wheat.

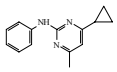
Table 17. Non-radiolabelled cyprodinil rotational crop studies.

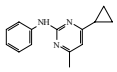
First crop or application target, country, year, ref.	Application				PHI [1/]	Rotational crop	TSI [2/]	THI [3/]	Sample	Residue, cyprodinil
	Compound	Form	No	kg ai/ha	days		days	days		mg/kg
Bare ground application, USA (CA), 1997 174-97 02-FR-019-97	cyprodinil	75WG	4	0.56		wheat	30	142	forage	<0.05
								204	hay	<0.05
								307	straw	<0.05
								307	grain	<0.02
Bare ground application, USA (FL), 1997 174-97 07-FR-020-97	cyprodinil	75WG	4	0.56		lettuce	30	97	head	<0.02
						turnip	30	109	tops	<0.02
						turnip	30	109	roots	<0.02
						wheat	30	105	forage	<0.05
						wheat	30	133	hay	<0.05
						wheat	30	167	straw	<0.05
						wheat	30	167	grain	<0.02
Bare ground application, USA (NY), 1997 174-97 05-FR-008-97	cyprodinil	75WG	4	0.56		lettuce	30	89	head	<0.02
						turnip	30	97	tops	<0.02
						turnip	30	97	roots	<0.02
						wheat	30	89	forage	<0.05
						wheat	30	286	forage	<0.05
						wheat	30	343	hay	<0.05
						wheat	30	372	straw	<0.05
						wheat	30	372	grain	<0.02
Bare ground application, USA (CA), 1998 174-97 02-FR-010-98	cyprodinil	75WG	4	0.56		lettuce	30	193	head	<0.02
						turnip	30	181	tops	<0.02
						turnip	30	181	roots	<0.02
Wheat, Germany, 2000 gr 33800	cyprodinil	75WG	1	0.77	14	radish	28	55		

[1/] PHI: preharvest interval of first crop, days.
[2/] TSI: interval between treatment on bare ground and sowing of rotation crop, days.
[3/] THI: interval between treatment on bare ground and sampling or harvest of rotation crop, days.

Table 18. Levels of cyprodinil and metabolites in rotational crops resulting from the use of non-radiolabelled cyprodinil.

First crop country, year, ref.	Application			PHI days [1/]	Rotational crop	TSI days [2/]	THI days [3/]	Sample	Residues, mg/kg		
	Form	No	kg ai/ha						cyprodinil 	NOA 422054 	CGA 321915 
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	radish	28	55	whole plant	<0.01	<0.01	<0.01
							61	roots	<0.01	<0.01	<0.01
							61	leaves	<0.01	<0.01	<0.01
							68	roots	<0.01	<0.01	<0.01
							68	leaves	<0.01	<0.01	<0.01
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	head lettuce	28	55	whole plant	<0.01	<0.01	<0.01
							72	whole plant	<0.01	<0.01	<0.01
							79	head	<0.01	<0.01	<0.01
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	spring wheat	28	55	whole plant	<0.01	0.01	<0.01
							127	ears	<0.01	<0.01	<0.01
							127	stalks	<0.01	<0.01	<0.01
							153	grain	<0.01	<0.01	<0.01
							153	straw	<0.01	<0.01	<0.01
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	radish	120	141	whole plant	<0.01	<0.01	<0.01
							148	roots	<0.01	<0.01	<0.01
							148	leaves	<0.01	<0.01	<0.01
							155	roots	<0.01	<0.01	<0.01
							155	leaves	<0.01	<0.01	<0.01
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	head lettuce	120	134	whole plant	<0.01	<0.01	<0.01
							148	whole plant	<0.01	<0.01	<0.01
							155	head	<0.01	<0.01	<0.01

First crop country, year, ref.	Application			PHI days [1]	Rotational crop	TSI days [2]	THI days [3]	Sample	Residues, mg/kg		
	Form	No	kg ai/ha						cyprodinil 	NOA 422054 	CGA 321915 
Winter wheat (Kanzler), Germany, 2000 gr 33800	75WG	1	0.77	14	spring wheat	370	401	whole plant	<0.01	<0.01	<0.01
							475	ears	<0.01	<0.01	<0.01
							475	stalks	<0.01	<0.01	<0.01
							510	grain	<0.01	<0.01	<0.01
							510	straw	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	spring wheat (Samoa)	37	63	plants	0.01	<0.01	<0.01
							119	ears	<0.01	<0.01	<0.01
							119	stalks	<0.01	<0.01	<0.01
							147	grain	<0.01	<0.01	<0.01
							147	straw	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	radish (French breakfast)	37	63	plant	<0.01	<0.01	<0.01
							71	root	<0.01	<0.01	<0.01
							71	top	<0.01	<0.01	<0.01
							76	root	<0.01	<0.01	<0.01
							76	top	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	head lettuce (Roxette)	37	51	plant	<0.01	<0.01	<0.01
							92	plant	<0.01	<0.01	<0.01
							99	plant	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	spring wheat (Raffles)	314	386	plants	<0.01	<0.01	<0.01
							440	ears	<0.01	<0.01	<0.01
							440	stalks	<0.01	<0.01	<0.01
							476	grain	<0.01	<0.01	<0.01
							476	straw	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	radish (Cherry Belle)	112	136	plant	<0.01	<0.01	<0.01
							143	root	<0.01	<0.01	<0.01
							143	top	<0.01	<0.01	<0.01
							150	root	<0.01	<0.01	<0.01
							150	top	<0.01	<0.01	<0.01
Spring wheat, UK, 1999 209/99	75WG	1	0.75	15	head lettuce (Brandon)	112	136	plant	<0.01	<0.01	<0.01
							169	plant	<0.01	<0.01	<0.01
							176	plant	<0.01	<0.01	<0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	radish (Cherry Belle)	35	58	plant	<0.01	0.02	0.03
							66	root	<0.01	<0.01	<0.01
							66	top	<0.01	0.04	<0.01
							72	root	<0.01	<0.01	<0.01
							72	top	<0.01	0.04	<0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	head lettuce (Calgary)	35	51	plants	<0.01	<0.01	<0.01
							69	plants	<0.01	<0.01	<0.01
							80	plants	<0.01	<0.01	<0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	spring wheat (Raffles)	35	69	whole plant	<0.01	0.05	<0.01
							120	ears	<0.01	<0.01	<0.01
							120	stalks	<0.01	0.02	<0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	radish (French breakfast)	114	133	plant	<0.01	0.02	<0.01
							141	root	<0.01	<0.01	<0.01
							141	top	<0.01	0.01	<0.01
							150	root	<0.01	<0.01	<0.01
							150	top	<0.01	<0.01	<0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	head lettuce (Calgary)	114	133	plants	<0.01	0.02	0.01
Spring wheat (Axona), UK, 1999 210/99	75WG	1	0.75	15	spring wheat (Samoa)	316	401	whole plant	<0.01	<0.01	<0.01
							451	ears	<0.01	<0.01	<0.01
							451	stalks	<0.01	<0.01	0.01
							465	grain	<0.01	<0.01	<0.01
							465	straw	<0.01	<0.01	<0.01

First crop country, year, ref.	Application			PHI days [1]	Rotational crop	TSI days [2]	THI days [3]	Sample	Residues, mg/kg		
	Form	No	kg ai/ha						cyprodinil 	NOA 422054 	CGA 321915 
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	radish (Torero)	30	48	whole plant	<0.01	0.02	<0.01
							55	roots	<0.01	<0.01	<0.01
							55	leaves	<0.01	0.08	0.01
							62	roots	<0.01	<0.01	<0.01
							62	leaves	<0.01	0.13	0.03
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	head lettuce (Reskia)	30	48	whole plant	<0.01	0.02	<0.01
							62	whole plant	<0.01	0.04	0.01
							69	heads	<0.01	0.01	<0.01
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	spring wheat (Albis)	30	57	whole plant	<0.01	0.04	0.02
							114	ears	<0.01	<0.01	<0.01
							114	stalks	<0.01	<0.01	<0.01
							135	straw [4]	<0.01	<0.01	<0.01
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	radish (Ilka)	120	135	whole plant	<0.01	<0.01	<0.01
							148	roots	<0.01	<0.01	<0.01
							148	leaves	<0.01	<0.01	<0.01
							155	roots	<0.01	<0.01	<0.01
							155	leaves	<0.01	<0.01	<0.01
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	head lettuce (Nadine)	120	135	whole plant	<0.01	<0.01	<0.01
							159	whole plant	<0.01	<0.01	<0.01
							166	heads	<0.01	<0.01	<0.01
Spring wheat (Albis), Switzerland, 1999 201/00	75WG	1	0.75	15	spring wheat (Albis)	331	376	whole plant	<0.01	<0.01	<0.01
							448	ears	<0.01	<0.01	<0.01
							448	stalks	<0.01	<0.01	<0.01
							467	grain	<0.01	<0.01	<0.01
							467	straw	<0.01	<0.01	<0.01

[1] PHI: preharvest interval of first crop, days.
[2] TSI: interval between treatment on bare ground and sowing of rotation crop, days.
[3] HI: interval between treatment on bare ground and sampling or harvest of rotation crop, days.
[4] Harvested before grain had developed.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The Meeting received descriptions and validation data for analytical methods for the determination of residues of cyprodinil and its metabolites in crop and animal commodities. Methods are summarized below and analytical recoveries are summarized in Table 19. The methods relied on HPLC and GC and LOQs of 0.01-0.02 mg/kg were generally achieved in crop and animal matrices.

Plant material, wine

Analyte:	cyprodinil	HPLC, REM 141.01, Ref: Dieterle, 1989
LOQ:	wine 0.005 mg/kg; plant material 0.02-0.05 mg/kg	
Description	Homogenized samples were extracted with aqueous methanol. The extract was cleaned-up on a cation exchange cartridge. HPLC (single-column or two-column-switching systems) with UV detection (λ_{max} 270 nm) was used for the final measurement.	

Kidney, liver, meat, fat, eggs, milk

Analyte:	cyprodinil	HPLC, REM 141.06, Ref: Kissling, 1995a
LOQ:	0.01 mg/kg	
Description	Homogenized samples of kidney, liver or meat were extracted with aqueous methanol. Eggs were extracted with acetone. Fat was dissolved in hexane and the residue was partitioned into hydrochloric acid and acetonitrile. Milk was diluted with acetonitrile and macerated. Filtered or centrifuged extracts were then cleaned-up by passage through one or more clean-up cartridges. HPLC (single-column or two-column-switching systems) with UV detection (λ_{max} 270 nm) was used for the final measurement.	

Tomatoes, oranges, wheat, rapeseed

Analyte:	cyprodinil	GC, DFG method S1, SYN-0108V, Ref: Pelz, 2001.
LOQ:	0.02 mg/kg	

Description	Specimen material (tomato, orange, wheat) was extracted with acetone after addition of water. Rapeseed was extracted with acetone + acetonitrile. Residues were partitioned into ethyl acetate/cyclohexane after addition of sodium chloride. Clean-up is effected by gel permeation chromatography before final determination of cyprodinil by GC with a mass-selective detector (*m/z* 210, 224, 225, 226).	
Plant material		
Analytes:	cyprodinil, CGA 321915, NOA 422054	LC-LC-MS/MS, REM 141.09, Ref: Tribolet, 2002a.
LOQ:	0.01 mg/kg	
Description	Homogenized material was extracted with aqueous methanol and, for determination of cyprodinil residues, the extract was ready, after dilution, for injection into the LC-LC-MS/MS system (*m/z* = 226, 93, 77). For the metabolites, an aliquot was subjected to cellulase cleavage at 37ºC for 16 hours, before dilution and LC-LC-MS/MS analysis (CGA 321915 *m/z* = 151, 108, 93; CGA 422054 *m/z* 166, 79, 106).	
Animal tissues, milk, eggs		
Analyte:	cyprodinil	HPLC, AG-635, Ref: Van Geluwe, 1995jj
LOQ:	0.01 mg/kg	
Description	See REM 141.06.	

Wurz (1995c) tested the behaviour of cyprodinil and metabolite CGA 232449 through the analytical procedures of the US FDA Pesticide Analytical Manual. The compounds were amenable to detection by GC with NP detectors and were recovered through procedures for non-fatty foods, but not through the procedures for fatty foods.

Table 19. Analytical recoveries for spiked cyprodinil and metabolites in various substrates.

Commodity	Analyte	Spike level mg/kg	N [1/]	Mean recovery %	Recovery range, %	Method	Reference [2/]
Apple	cyprodinil	0.04-0.2	4	96	91-100	HPLC REM 141.01	
Apple	cyprodinil	0.02-0.2	10	102	91-117	HPLC REM 141.01	AG-631A
Apple pulp	cyprodinil	0.01-0.2	2		71, 113	HPLC REM 141.01	ABR-95065
Apple, whole	cyprodinil	0.01-0.2	2		73, 84	HPLC REM 141.01	ABR-95065
Apples	cyprodinil	0.01-0.2	10	101	95-113	HPLC REM 141.01	215/00
Barley grain	cyprodinil	0.04-0.2	4	94	90-97	HPLC REM 141.01	
Barley grain	cyprodinil	0.02-0.2	6	98	94-102	HPLC REM 141.01	18961
Barley straw	cyprodinil	0.1-0.5	9	89	81-107	HPLC REM 141.01	
Cereal whole plant	cyprodinil	0.02-0.2	6	82	76-90	HPLC REM 141.01	18961
Cherries	cyprodinil	0.02-0.1	6	94	90-100	HPLC REM 141.01	ABR-94088
Cherries	cyprodinil	0.02-3	6	104	85-118	HPLC REM 141.01	AG-631A
Egg yolk	cyprodinil	0.01-1	10	95	76-104	HPLC REM 141.06	ABR-95075
Eggs	cyprodinil	0.01-0.2	9	90	74-110	HPLC REM 141.06	
Fat, cow	cyprodinil	0.01-0.2	10	76	66-82	HPLC REM 141.06	
Grapes	cyprodinil	0.02 -0.1	8	90	77-98	HPLC REM 141.01	
Grapes	cyprodinil	0.01-0.2	15	106	95-115	HPLC REM 141.01	215/00
Grapes	cyprodinil	0.01-0.1	10	103	85-121	LCMS REM 141.09	02-S202
Kidney, cow	cyprodinil	0.01-0.2	6	94	83-118	HPLC REM 141.06	
Kidney, goat	cyprodinil	0.01-0.05	2		80-82	HPLC REM 141.06	ABR-95075
Lean meat, poultry	cyprodinil	0.01-0.1	4	97	91-106	HPLC REM 141.06	ABR-95075
Lettuce	cyprodinil	0.01-0.1	10	101	92-112	LCMS REM 141.09	02-S202
Liver, beef	cyprodinil	0.01-0.1	6	80	63-93	HPLC REM 141.06	ABR-95054
Liver, goat	cyprodinil	0.01-0.5	10	84	70-94	HPLC REM 141.06	ABR-95075
Liver, poultry	cyprodinil	0.01-5	4	90	80-115	HPLC REM 141.06	ABR-95075
Liver, sheep	cyprodinil	0.01-0.2	6	82	73-93	HPLC REM 141.06	
Meat, cow	cyprodinil	0.01-0.2	6	80	68-99	HPLC REM 141.06	
Milk	cyprodinil	0.01-0.2	10	95	74-107	HPLC REM 141.06	
Milk	cyprodinil	0.01-0.1	6	74	60-91	HPLC REM 141.06	ABR-95054
Milk, goat	cyprodinil	0.01-2	9	88	73-100	HPLC REM 141.06	ABR-95075
Muscle, goat	cyprodinil	0.01-0.2	6	92	71-109	HPLC REM 141.06	ABR-95075
Orange, fruit	cyprodinil	0.02-0.2	10	95	83-103	GC DFG method S19	SYN-0108V
Peach	cyprodinil	0.02-2	7	102	93-118	HPLC REM 141.01	AG-631A
Pear	cyprodinil	0.02-0.05	6	94	86-99	HPLC REM 141.01	AG-631A
Plums, prunes	cyprodinil	0.02-1	8	99	78-115	HPLC REM 141.01	AG-631A

Commodity	Analyte	Spike level mg/kg	N [1/]	Mean recovery %	Recovery range, %	Method	Reference [2/]
Radish roots	cyprodinil	0.01-0.1	10	96	91-101	LCMS REM 141.09	02-S202
Rapeseed	cyprodinil	0.02-0.2	10	95	89-99	GC DFG method S19	SYN-0108V
Rapeseed	cyprodinil	0.01-0.1	10	76	53-85	LCMS REM 141.09	02-S202
Tomato, fruit	cyprodinil	0.02-0.2	10	105	98-116	GC DFG method S19	SYN-0108V
Tomato, fruit	cyprodinil	0.02-0.2	10	97	81-107	GC DFG method S19	SYN-0109V
Wheat grain	cyprodinil	0.02-0.2	10	92	87-94	GC DFG method S19	SYN-0108V
Wheat grain	cyprodinil	0.02-0.2	10	94	83-102	GC DFG method S19	SYN-0109V
Wheat grain	cyprodinil	0.04-0.2	8	99	93-109	HPLC REM 141.01	
Wheat grain	cyprodinil	0.01-0.2	10	102	96-109	HPLC REM 141.01	215/00
Wheat grain	cyprodinil	0.01-0.1	10	94	81-102	LCMS REM 141.09	02-S202
Wheat straw	cyprodinil	0.1-0.5	8	92	85-97	HPLC REM 141.01	
Wheat straw	cyprodinil	0.02-0.2	6	99	95-101	HPLC REM 141.01	18961
Wheat straw	cyprodinil	0.05-0.5	10	94	79-112	HPLC REM 141.01	215/00
Wheat straw	cyprodinil	0.01-0.1	10	82	69-92	LCMS REM 141.09	02-S202
Wine	cyprodinil	0.01-0.05	8	91	84-101	HPLC REM 141.01	
Wine	cyprodinil	0.005-0.05	10	102	95-108	HPLC REM 141.01	215/00
Grapes	NOA 422054	0.01-0.1	10	95	66-103	LCMS REM 141.09	02-S202
Lettuce	NOA 422054	0.01-0.1	10	103	93-110	LCMS REM 141.09	02-S202
Radish roots	NOA 422054	0.01-0.1	10	100	95-107	LCMS REM 141.09	02-S202
Rapeseed	NOA 422054	0.01-0.1	10	92	66-103	LCMS REM 141.09	02-S202
Wheat grain	NOA 422054	0.01-0.1	10	87	70-96	LCMS REM 141.09	02-S202
Wheat straw	NOA 422054	0.01-0.1	10	89	80-106	LCMS REM 141.09	02-S202
Grapes	CGA 321915	0.01-0.1	10	97	69-104	LCMS REM 141.09	02-S202
Lettuce	CGA 321915	0.01-0.1	10	104	97-109	LCMS REM 141.09	02-S202
Radish roots	CGA 321915	0.01-0.1	10	97	85-107	LCMS REM 141.09	02-S202
Rapeseed	CGA 321915	0.01-0.1	10	99	74-118	LCMS REM 141.09	02-S202
Wheat grain	CGA 321915	0.01-0.1	10	79	71-91	LCMS REM 141.09	02-S202
Wheat straw	CGA 321915	0.01-0.1	10	79	70-89	LCMS REM 141.09	02-S202

[1/] N: number of recovery tests for the spike concentration range.
[2/] Where no reference is given, the recovery data were provided with the initial description of the method.

Tomato plants were treated twice, by spray application, with a WP formulation containing [^{14}C-phenyl]cyprodinil at the equivalent of 0.75 kg ai/ha, and tomatoes were harvested 15 days after the second application (Dieterle, 1992a). Washed tomato fruit were extracted and analyzed for ^{14}C and for cyprodinil by method REM141.01. The accountability of ^{14}C-cyprodinil in the extract, as measured by HPLC, was 47 % of the total ^{14}C value (43-53%, n = 4). It was noted that in the metabolism project (Neumann, 1992a), 55% of the ^{14}C in tomato fruits remained as unchanged cyprodinil.

Tissues, milk and eggs from the goat and poultry metabolism studies (both label positions) were subjected to analysis by analytical method REM 141.06 (van Geluwe, 1995r). The levels of cyprodinil itself were too low to be measured by the method (below LOQ), but the tests did provide information on the percentage extractability of the ^{14}C by Method REM 141.06, as follows:

	[U-^{14}C-phenyl] label	[2-^{14}C-pyrimidine] label
Goat muscle (n=3)	75%	64%
Goat kidney (n=2)	98%	80%
Goat liver (n=3)	66%	57%
Goat milk (n=3)	59%	61%
Hen lean meat (n=3)	31%	70%
Hen liver (n=2)	47%	60%
Egg yolks (n=3)	75%	81%

Stability of residues in stored analytical samples

The Meeting received information on the stability of residues of cyprodinil and its metabolites, CGA 321915 and NOA 422054, in various substrates at freezer temperatures for 1-2 years. Cyprodinil residues were generally stable for the duration of the testing, i.e. the decline in residue level was not

evident or was less than 30%. Stability in peaches was questionable but low and variable procedural recoveries suggested that there were other problems with the analyses.

Eudy (1996) tested the storage stability of cyprodinil spiked into apple and apple pomace matrices, and of field-incurred cyprodinil residues in a peach matrix, in amber glass jars in a freezer at -20°C (Table 20). Eudy (1997) also tested spiked animal commodities (Table 20). Kissling (1995h) tested the storage stability of field-incurred cyprodinil residues in grapes, apples, wheat ears and wheat stalks, and of cyprodinil spiked into strawberries, potatoes and wine, stored as bulk matrix samples in a freezer, below -18°C (Table 21). Tribolet (2002b) tested the freezer storage stability of residues of the metabolites, CGA 321915 and NOA 422054 (Table 22). Homogenized and fortified matrices were stored in polyethylene containers or polyethylene bags, in deep-freeze rooms, below -18°C. Periodically, over 18 months, sub-samples were taken from the bulk materials for analysis.

Table 20. Freezer storage data for cyprodinil residues in various matrices stored at -20°C.

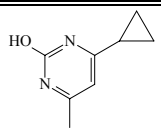
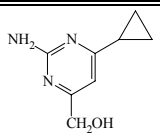
Storage interval, days	Residues in stored samples, mg/kg	Procedural recovery, %
Peaches, incurred residues (Eudy, 1996). Estimated time for 30% decline: 10 months		
0	1.00, 1.06	88, 86
63	1.11, 0.91	73, 91
226	0.95, 0.68	98, 80
366	0.66, 0.89 [1/]	60, 63
Apple pomace, fortified at 0.5 mg/kg (Eudy, 1996). Residue stable for duration, 12 months		
0	0.40, 0.38	83, 72
62	0.37, 0.36	74, 82
186	0.42, 0.40	88, 86
375	0.43, 0.46	105, 102
Apples, fortified at 1 mg/kg (Eudy, 1996). Residue stable for duration, 12 months		
0	0.89, 0.85	97, 95
62	0.91, 0.77	94, 90
181	0.92, 0.92	97, 72
369	0.82, 0.78	99, 92
Beef muscle, fortified at 0.5 mg/kg (Eudy, 1997). Apparent rapid decline of 30 % in first 2 months; subsequent stability		
0	0.49, 0.48	83, 96
61	0.33, 0.36	101, 97
216	0.33, 0.30	96, 98
390	0.28, 0.27	85, 87
565	0.31, 0.31	88, 90
Beef liver, fortified at 0.5 mg/kg (Eudy, 1997). Residue stable for duration, 18 months		
0	0.48, 0.46	85, 85
58	0.41, 0.42	89, 90
202	0.41, 0.39	88, 92
377	0.38, 0.37	94, 91
547	0.38, 0.38	73, 79
Milk, fortified at 0.5 mg/kg (Eudy, 1997). Residue stable for duration, 18 months		
0	0.40, 0.34	81, 78
58	0.46, 0.42	81, 87
203	0.46, 0.45	93, 90
372	0.55, 0.54	99, 97
552	0.42, 0.44	90, 83
Eggs, fortified at 0.5 mg/kg (Eudy, 1997). Residue stable for duration, 18 months		
0	0.57, 0.51	109, 108
75	0.51, 0.51	100, 102
176	0.56, 0.54	99, 108
354	0.57, 0.54	91, 95
546	0.50, 0.56	103, 114

[1/] Values not accepted because the average procedural recovery was <70 %.

Table 21. Freezer storage data for cyprodinil residues in various matrices stored below -18°C.

Storage interval, days	Residue in stored sample, % of initial	Procedural recovery %
Grapes, 7 days PHI, incurred residue initially 1.8 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	94, 82	86, 94, 92, 78
14	83, 90, 97	88, 90, 89, 89
33	108, 101, 96	90, 90
89	72, 74, 66	72, 74
180	104, 86, 93	81, 80
355	112, 123, 97	87, 93
721	112, 102, 97	91, 91
Apples, 7 days PHI, incurred residue initially 0.41 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	88, 69, 88	82, 90, 77, 80
33	81, 79, 93	85, 85
89	96, 88, 101	87, 85
180	103, 91, 84	86, 88
355	93, 91, 91	79, 84
721	114, 94, 104	97, 93
Wheat ears, 7 days PHI, incurred residue initially 10.2 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	78, 81, 80, 85	81, 81
28	78, 80, 84	79, 79
92	86, 90, 87	87, 85
169	88, 83, 83	79, 78
363	84, 87, 86	88, 82
741	92, 97, 93	88, 90
Wheat stalks, 7 days PHI, incurred residue initially 20.9 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	83, 85, 78	81, 82
33	87, 83, 81	74, 73
97	84, 81, 80	81, 77
174	78, 82, 79	76, 75
358	87, 84, 82	78, 78
746	92, 94, 91	87, 82
Strawberries, fortified at 0.5 mg/kg, initial residue 0.46 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	94, 87, 92	91, 99
34	94, 87, 96	90, 89
90	100, 100, 90	91, 82
181	92, 94, 94	103, 96
356	90, 92, 94	88, 88
722	102, 99, 91	90, 97
Potatoes, fortified 0.5 mg/kg, initial residue 0.52 mg/kg (Kissling, 1995h). Residue stable for duration, 24 months		
0	75, 87, 77	87, 72
34	83, 79, 75	90, 87
90	85, 81, 97	101, 94
181	89, 97, 93	92, 92
356	81, 85, 87	83, 89
722	84, 95, 91	98, 100
Wine, fortified 0.5 mg/l, initial residue 0.47 mg/l (Kissling, 1995h). Residue stable for duration, 24 months		
0	92, 92, 90	89, 92
34	96, 96, 94	97, 96
90	77, 75, 77	75, 74
185	98, 96, 90	107, 99
356	92, 90, 90	92, 91
722	100, 93, 94	96, 97

Table 22. Freezer storage data for cyprodinil metabolites CGA 321915 and NOA 422054 in various matrices, fortified at 0.5 mg/kg and stored below -18°C (Tribolet, 2002b).

Storage interval, months	CGA 321915		NOA 422054	
	Stored, mg/kg	Procedural recovery %	Stored, mg/kg	Procedural recovery %
Lettuce, both CGA 321915 and NOA 422054 stable for duration, 18 months.				
0	0.33, 0.32, 0.40	84, 87	0.35, 0.33, 0.42	91, 94
3	0.33, 0.32, 0.37	84, 86	0.34, 0.32, 0.36	93, 96
6	0.35, 0.36, 0.38	101, 100	0.31, 0.32, 0.35	100, 99
12	0.40, 0.39, 0.40	106, 105	0.36, 0.36, 0.35	105, 104
18	0.42, 0.43, 0.42	118, 108	0.32, 0.34, 0.34	106, 110
Wheat grain, both CGA 321915 and NOA 422054 stable for duration, 18 months.				
0	0.39, 0.34, 0.38	91, 86	0.43, 0.37, 0.40	96, 95
3	0.47, 0.48, 0.50 [1/]	76, 61	0.49, 0.47, 0.49	79, 62
6	0.51, 0.45, 0.49	103, 77	0.49, 0.45, 0.48	105, 77
12	0.47, 0.37, 0.45	98, 100	0.47, 0.37, 0.45	97, 98
18	0.28, 0.47, 0.36	93, 93	0.30, 0.48, 0.34	95, 97
Wheat straw, both CGA 321915 and NOA 422054 stable for duration, 18 months.				
0	0.36, 0.35, 0.38	75, 66	0.40, 0.39, 0.43	90, 86
3	0.31, 0.40, 0.28	74, 73	0.33, 0.38, 0.26	73, 75
6	0.45, 0.42, 0.42	95, 89	0.37, 0.34, 0.36	92, 87
12	0.47, 0.36, 0.35	84, 99	0.41, 0.30, 0.29	98, 99
18	0.44, 0.44, 0.42	85, 66	0.33, 0.33, 0.32	86, 69
Radish roots, CGA 321915 stable for duration, 18 months; NOA 422054 unstable in less than 3 months.				
0	0.28, 0.35, 0.36	87, 80	0.41, 0.38, 0.38	92, 87
3	0.38, 0.30, 0.32	95, 83	0.03, 0.03, 0.03	97, 97
6	0.34, 0.34, 0.31	94, 101	0.02, 0.02, 0.02	95, 99
12	0.38, 0.35, 0.32	102, 103	0.04, 0.04, 0.04	98, 101
18	0.58, 0.40, 0.36	116, 130	0.05, 0.03, 0.04	111, 132

[1/] Values not accepted because the average procedural recovery was <70%.

USE PATTERN

Cyprodinil is a systemic foliar and seed dressing fungicide that acts as an inhibitor of methionine biosynthesis. Information on registered uses was made available to the Meeting and is summarized in Table 23.

Table 23. Registered cyprodinil uses.

Crop	Country [1/]	Form	Application					PHI, days
			method [7/]	timing	rate kg ai/ha	conc. kg ai/hl	max. No.	
Almonds	USA **L**	WG 750	foliar spray	during blossom	0.26 to 0.53		[4/]	150
Apple	Australia **L**	WG 500	foliar spray	do not use after petal fall	0.40	0.032	4	
Apple	Canada **L**	WG 750	foliar spray	green tip until post bloom	0.28		6	72
Apple	Chile	WG 500	foliar spray	until end flowering	0.15			7
Apple	Italy **L**	WG 500	foliar spray	until fruit walnut-sized	0.23	0.015		21
Apple	USA **L**	WG 750	foliar spray	until end flowering	0.26		[3/]	72
Apricot	Canada **L**	WG 750	foliar spray		0.56		2	2
Apricot	France **L**	WG 375 (+ fludioxonil 250)	foliar			0.018	3	14
Apricot	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray	pre-harvest	0.30-0.38	0.023	2	14

Crop	Country [1/]	Form	Application					PHI, days
			method [7/]	timing	rate kg ai/ha	conc. kg ai/hl	max. No.	
Apricot	Italy **L**	WG 500	foliar spray	pre-harvest	0.38	0.025		7
Apricot	USA **L**	WG 750	foliar spray	during flowering, pre-harvest	0.26-0.53		[2/]	2
Barley	France **L**	EC 240 (+propiconazole 50)	foliar spray	until end of earing	0.48		2	
Beans	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.038	3	14
Beans	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30			
Beans, dwarf	Austria **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38		2	14
Berry crops [6/]	USA **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		[5/]	0
Blackberries	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38-0.45	0.031-0.038	2	14
Cherries, tart	USA **L**	WG 750	foliar spray	during flowering, pre-harvest	0.28-0.56		[2/]	2
Cucumber	Austria **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)		0.38		3	7
Cucumber	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.23-0.30	0.023-0.030	3	7
Cucumber	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.038	3	7
Cucumber	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)			0.038		3
Egg plant	Austria **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)		0.38		3	7
Egg plant	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.23-0.30	0.023-0.030	3	7
Egg plant	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.038	3	7
Egg plant	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.038		
Endive	France **L**	WG 375 (+ fludioxonil 250)	foliar (F + G)		0.19		2	14
Grapes	Australia **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30	.03	2	28
Grapes	Canada **L**	WG 750	foliar spray		0.56		2	7
Grapes	Chile **L**	WG 375 (+ fludioxonil 250)	foliar spray	at flowering	0.23-0.38		2	2
Grapes	France **L**	WG 375 (+ fludioxonil 250)	foliar spray	before bunch closure	0.38-0.45		1	50
Grapes	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.23-0.30	0.03	2	21
Grapes	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30 to 0.38		2	21
Grapes	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.45		1	
Grapes	USA **L**	WG 750	foliar spray		0.53		[2/]	7
Lettuce	France **L**	WG 375 (+ fludioxonil 250)	foliar (F + G)		0.19		2	14
Lettuce	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.19-0.26	0.019-0.026	3	14
Lettuce	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.19-0.23		3	14
Lettuce	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.19		2	

Crop	Country [1/]	Form	Application					PHI, days
			method [7/]	timing	rate kg ai/ha	conc. kg ai/hl	max. No.	
Nectarine	Canada **L**	WG 750	foliar spray		0.56		2	2
Nectarine	Italy **L**	WG 500	foliar spray	pre-harvest	0.38	0.025		7
Nectarine	USA **L**	WG 750	foliar spray	during flowering, pre-harvest	0.26-0.53		[2/]	2
Onion	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38		2	
Onion	USA **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		[5/]	7
Peach	Canada **L**	WG 750	foliar spray		0.56		2	2
Peach	France **L**	WG 375 (+ fludioxonil 250)	foliar		0.19	0.018	3	14
Peach	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray	pre-harvest	0.30-0.38	0.023	2	14
Peach	Italy **L**	WG 500	foliar spray	pre-harvest	0.38	0.025		7
Peach	USA **L**	WG 750	foliar spray	during flowering, pre-harvest	0.26 0.53		[2/]	2
Pear	Australia **L**	WG 500	foliar spray	do not use after petal fall	0.40	0.032	[3/]	
Pear	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray	pre-harvest	0.30-0.38	0.023-0.030	3	14
Pear	Italy **L**	WG 500	foliar spray	until end flowering	0.23-0.38	0.015-0.025		21
Pear	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38	0.030-0.038	3	14
Pear	USA **L**	WG 750	foliar spray	until end flowering	0.26		[3/]	72
Peas for canning	France **L**	WG 375 (+ fludioxonil 250)	foliar		0.38			14
Pepper, Sweet	Austria **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)		0.38		3	7
Pepper, Sweet	Chile **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		3	21
Pepper, Sweet	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.23-0.30	0.023-0.030	3	7
Pepper, Sweet	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.023-0.038	3	7
Pistachio	USA **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		[5/]	7
Plum	Canada **L**	WG 750	foliar spray		0.56		2	2
Plum	France **L**	WG 375 (+ fludioxonil 250)	foliar		0.19	0.018	3	14
Plum	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray	pre-harvest	0.30-0.38	0.023	2	14
Plum	Italy **L**	WG 500	foliar spray	pre-harvest	0.38	0.025		7
Plum	USA **L**	WG 750	foliar spray	during flowering; pre-harvest	0.26 0.53		[2/]	2
Pome fruits	USA **L**	WG 750	foliar spray	until end flowering	0.26		[3/]	72
Prunes	USA **L**	WG 750	foliar spray	during flowering; pre-harvest	0.26 0.53		[2/]	2
Raspberries	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38-0.45	0.031-0.038	2	14
Squash, Sumer	Austria **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)		0.38		3	7

Crop	Country [1/]	Form	Application					PHI, days
			method [7/]	timing	rate kg ai/ha	conc. kg ai/hl	max. No.	
Squash, Sumer	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.23-0.30	0.023-0.030	3	7
Stone fruits	USA **L**	WG 750	foliar spray	during flowering; pre-harvest	0.26-0.53		[2/]	2
Strawberry	France **L**	WG 375 (+ fludioxonil 250)	foliar		0.38		1	3
Strawberry	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)	swelling of first fruit	0.30	0.03	3	7
Strawberry	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		3	7
Strawberry	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.38-0.45	0.031-0.038	2	14
Strawberry	USA **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		[5/]	0
Tomato	Chile **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		3	21
Tomato	Italy **L**	WG 375 (+ fludioxonil 250)	foliar spray (F + G)		0.23-0.30	0.023-0.030	3	7
Tomato	Spain **L**	WG 375 (+ fludioxonil 250)	foliar spray			0.038	3	7
Tomato	Switzerland **L**	WG 375 (+ fludioxonil 250)	foliar spray (G)		0.30	0.03		3
Watercress	USA **L**	WG 375 (+ fludioxonil 250)	foliar spray		0.30-0.38		[5/]	0
Wheat	France **L**	EC 240 (+propiconazole 50)	foliar spray	end of earing	0.60		3	

[1/] **L:** Label provided**.**
[2/] Do not apply more than 1.1 kg ai/ha per year.
[3/] Do not apply more than 1.2 kg ai/ha per year.
[4/] Do not apply more than 1.6 kg ai/ha per year.
[5/] Do not apply more than 1.5 kg ai/ha per year.
[6/] Berry crops: bushberries (blueberries, currants, gooseberries, elderberry, huckleberry); caneberries (blackberries, raspberries); juneberry; lingonberry.
[7/] G: use in glasshouse or under cover. F + G: use in the field or under cover.

RESIDUES RESULTING FROM SUPERVISED TRIALS

The Meeting received information on supervised field trials for the following crops.

Pome fruits	Table 25	Apples
	Table 26	Pears
Stone fruits	Table 27	Apricots, cherries, nectarines, peaches, plums
Berry fruits	Table 28	Grapes
	Table 29	Strawberries
	Table 30	Raspberries
Bulb vegetables	Table 31	Onions
Cucurbits	Table 32	Cucumbers
Fruiting vegetables	Table 33	Egg plant
	Table 34	Tomatoes
	Table 35	Sweet peppers
Leafy vegetables	Table 36	Lettuce
Legume vegetables	Table 37	Beans
	Table 38	Peas
Cereal grains	Table 39	Barley
	Table 40	Rye
	Table 41	Wheat
Tree nuts	Table 42	Almonds

Cereal straw and fodder	Table 43	Barley straw and fodder
	Table 44	Rye straw and fodder
	Table 45	Wheat straw and fodder
Miscellaneous fodder	Table 46	Almond hulls

Trials were well documented, with laboratory and field reports. Laboratory reports included method validation, including procedural recoveries with spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analyses or duration of residue sample storage were also provided. Although trials included control plots, no control data are recorded in the tables, except where residues in control samples exceeded the LOQ. Residue data are recorded unadjusted for recovery.

Where residues were not detected they are shown as below the LOQ (e.g. <0.05 mg/kg). Residues, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. These results are double underlined.

Conditions of the supervised residue trials are summarized in Table 24 Most trial designs used non-replicated plots. Most field reports provided data on the sprayers used, plot size, residue sample size and sampling date.

Intervals of freezer storage, between sampling and analysis, were recorded for all trials and were covered by the conditions of the freezer storage stability studies.

In some trials, residues were measured in samples taken just before the final application, as well as just after (the "zero day" samples). The samples taken just before the final application are listed in the tables with one fewer application than the final, and with a PHI equivalent to the interval between the penultimate and final applications. These samples provide information on the carryover of residue from applications previous to the final. For cyprodinil uses on fruit, the carryover was typically around 35% of the zero day residue.

Table 24. Summary of sprayers, plot sizes and field sample sizes in the supervised trials. Almost all trials were designed as unreplicated single plots.

Crop	Country	Year	Sprayer	Plot size	Sample size
Almonds	USA	1995	air-blast sprayers		
Apples	France	1994	knapsack	24 m^2	
Apples	Italy	1993, 95	knapsack, motorspray	30, 80 m^2, 81 trees	12 fruits min
Apples	Switzerland	1992-94	motor knapsack	4 trees - 80 m^2	12-24 fruits
Apples	USA	1994-95	air-blast sprayers		
Apricots	Europe	1997-2000	knapsack	4 trees - 108 m^2	1.6-3 kg
Barley	France	1993-98	knapsack boom spray	20-200 m^2	0.5-50 kg
Barley	Germany	1998-9	high volume plot sprayer	30-172 m^2	0.5-50 kg
Barley	Switzerland	1993	knapsack boom spray	60 m^2	0.7, 1.5 kg
Beans	France	1996-98	knapsack	30-150 m^2	1-4 kg
Beans	Spain	1996-97	knapsack, motor sprayer	28-100 m^2	1-2.2 kg
Beans	Switzerland	1998	knapsack	30, 36 m^2	1.7 kg
Cherry	USA	1994-98	air-blast sprayers		
Cucumbers	Greece	1995-96	knapsack	20, 25 m^2	1 kg, 25 fruits
Cucumbers	Spain	1995-2000	motor sprayer, motorised backpack	24-72 m^2	2-6 kg 12 fruits
Cucumbers	Switzerland	1996	Spray-matic	17 m^2	12 fruits
Egg plant	Italy	1997	knapsack	18, 20 m^2	2, 4 kg
Egg plant	Spain	1999	motorised backpack	68, 80 m^2	12 fruits
Grapes	Chile	1996	motorised backpack	180-320 m^2	5 kg
Grapes	France	1995-96	knapsack, knapsack mistsprayer	30-104 m^2	
Grapes	Germany	1994-99	plot sprayer	29-300 m^2	1.2-100 kg
Grapes	Italy	1995-97	motorised backpack, hand sprayer	80-192 m^2	1.2-1.4 kg
Grapes	South Africa	1991-98	tractor and mist-blower, motorised backpack	18-299 m^2, 40-48 vines	1 kg, 40 kg
Grapes	Spain	1994-2001	motor sprayer, motorised backpack	120-243 m^2	1-2.2 kg

Crop	Country	Year	Sprayer	Plot size	Sample size
Grapes	Switzerland	1990-97	motorised backpack, motor sprayer	8-225 m^2	2 kg, 12 bunches
Grapes	USA	1995	air-blast sprayers, CO_2 backpack		
Kidney beans	France	2000	knapsack	50 m^2	0.55-1.6 kg
Lettuce	France	1996-98	knapsack	30-40 m^2	1-9 kg, 12 heads
Lettuce	Germany	1998	mobile plot sprayer	30 m^2	0.5-4.2 kg
Lettuce	Italy	1996, 2001	knapsack , motor sprayer	6.8-38 m^2	0.45-4 kg
Lettuce	Spain	1996-97	motor sprayer	50-100 m^2	1.4-4.4 kg
Lettuce	Switzerland	1996-97	knapsack	18 m^2	12 heads
Nectarines	Italy	1994	tractor sprayer	20 trees	
Onions	France	2000	knapsack	30 m^2	2.3-4 kg
Onions	Germany	1999-2000	mobile plot sprayer	30-75 m^2	1.1-1.7 kg
Onions	Italy	1999-2000	knapsack	30-40 m^2	1-3.3 kg
Peaches	France	1994	knapsack	27, 72 m^2	
Peaches	Greece	1999-2000	knapsack	4 trees	3.5, 4.2 kg
Peaches	Italy	1996, 2001	knapsack, motorised backpack	8-10 trees, 102-168 m^2	24 fruit
Peaches	USA	1994-97	air-blast sprayers		
Pears	France	1997	knapsack air-blast sprayers	45 m^2	1.6-2.2 kg
Pears	Italy	1996-97	knapsack, motor sprayer	42-70 m^2	2-3 kg
Pears	Spain	1997, 2001		61-90 m^2	2-3 kg
Pears	USA	1994			
Peas	France	1995-2001	knapsack boom spray	30-60 m^2	0.5-2.3 kg
Peas	Switzerland	1995-98	knapsack, sprayer with bar	30-120 m^2	1.3-3.7 kg
Peppers, sweet	Italy	1996	motor sprayer	8 m^2	2 kg
Peppers, sweet	Spain	1996-97	motor sprayer, knapsack	27-112 m^2	1.5-2 kg
Plums	France	1994, 1998	knapsack, knapsack mist-sprayer	60-180 m^2	1.5-2 kg
Plums	Germany	1998, 2000	tractor, portable sprayer	60-160 m^2	1.2-100 kg
Plums	Italy	2000-01	motor sprayer, knapsack	120-200 m^2	1-2.5 kg
Plums	Switzerland	1997	knapsack	43-64 m^2	2.5-5 kg
Plums	Switzerland	2000	knapsack motor sprayer	128 m^2	100 kg
Plums	USA	1994	air-blast sprayers		
Raspberries	Germany	1999-2000	motorised backpack, tractor, portable sprayer	50-136 m^2	0.5-1 kg
Rye	Germany	1993-98	plot sprayers	30-125 m^2	0.5-2 kg
Strawberries	France	1995-2001	knapsack	40-100 m^2	1-28 kg
Strawberries	Germany	1995-96	mobile plot sprayers	25-101 m^2	1.1-14 kg
Strawberries	Italy	2001	motorised backpack	31 m^2	1.1 kg
Strawberries	Spain	1994, 2001	knapsack	17-45 m^2	2.2 kg
Strawberries	Switzerland	1995	sprayer with boom	24, 30 m^2	0.3-3 kg
Strawberries	USA	1996-97	CO_2 backpack, R&D sprayer		
Tomatoes	Greece	1995-96	knapsack	20 m^2	2 kg, 12 fruits
Tomatoes	Italy	1995	motor sprayer	12-20 m^2	2-5 kg
Tomatoes	Spain	1994-95	knapsack	20-27 m^2	
Tomatoes	Switzerland	1994-99	motorised backpack, knapsack	8-126 m^2	12 fruits, 210 kg
Tomatoes	UK	1997	propane gas plot sprayer	58 m^2	20 fruits
Wheat	Denmark	1994	knapsack	144 m^2	
Wheat	France	1992-99	knapsack, boom sprayer	20-45 m^2	0.5-2 kg
Wheat	Germany	1995-98	mobile plot sprayers	30-150 m^2	0.5-1 kg
Wheat	South Africa	1991	CO_2 backpack	60 m^2	
Wheat	Switzerland	1990, 1993, 2000	knapsack	27-150 m^2	0.7-60 kg
Wheat	UK	1991	hand held sprayer	2900 m^2	

Table 25. Cyprodinil residues in apples resulting from supervised trials in France, Italy, Switzerland and the USA.

APPLES Location, year (variety), report no.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1994 (Reine des Reinettes) OF94124 trial FP07	WG	0.25		500	6	56 70 84 84	fruit fruit mature fruit apple juice	<0.02 <0.02 <0.02 <0.01
France, 1994 (Reine des Reinettes) OF94126 trial FP08	WG included captan	0.23		500	6	56 70 84 84	fruit fruit mature fruit apple juice	0.02 <0.02 <0.02 <0.01
Italy, 1993 (Braeburn) 2104/93	WG	0.23	0.015	1500	8	0 7 14 28 42	fruit	0.55 0.39 0.33 0.18 0.13
Italy, 1993 (Imperatore) 2103/93	WG	0.33 +0.31 +0.32 +0.30 +0.27 +0.29 +0.29	0.015	2200 +2100 +2200 +2000 +1800 +1900 +1900	7	0 14 28 35 42	fruit	0.44 0.33 0.22 0.16 0.13
Italy, 1995 (Dallago) 2083/95	WG	0.23	0.019-0.023	1000-1200	6	20 111 125 134 141	immature fruit	0.09 <0.02 0.02 <0.02 <0.02
Switzerland, 1992 (Golden Delicious) 2015/92	WG	0.23	0.015	1500	6	0 15 34 76	fruit	0.38 0.11 0.04 0.02
Switzerland, 1992 (Summerred) 2014/92	WG	0.23	0.015	1500	6	0 7 14 21	fruit	0.71 0.36 0.19 0.18
Switzerland, 1993 (Golden Delicious) 2009/93	WG	0.23	0.015	1500	6	47 75	fruit	0.03 0.02
Switzerland, 1993 (Summerred) 2008/93	WG	0.23	0.015	1500	6	0 24	fruit	0.95 0.11
Switzerland, 1994 (Summerred) 2054/94	WG included captan	0.23	0.023	1000	6	0 45 59 73 73	fruit fruit fruit fruit juice	2.8 0.04 0.02 <0.02 <0.005
Switzerland, 1994 (Summerred) 2051/94	WG	0.23	0.023	1000	6	0 45 59 73 73 73	fruit fruit fruit fruit juice wet pomace	3.0 0.04 0.02 <0.02 <0.005 0.03
USA (CA), 1994 (Granny Smith) 02-FR-031-94	WP	0.28		2700	6	72 135	fruit fruit	0.02 <0.02
USA (CA), 1994 (Granny Smith) 02-FR-031-94	WP	0.56		2700	6	72 135	fruit fruit	0.052 <0.02
USA (CA), 1995 (Granny Smith) OW-FR-519-95	WP	0.28		480	6	0 7 14 21 28 72	fruit fruit fruit fruit fruit fruit	0.25 0.14 0.091 0.069 0.051 <0.02

APPLES Location, year (variety), report no.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995 (Rome) OW-FR-419-95	WP	0.28		1870	6	0 72 132	fruit fruit fruit	1.7 <0.02 <0.02
USA (MI), 1994 (Red Delicious) NE-FR-712-94	WP	0.28		940	6	72	fruit	<0.02
USA (NC), 1994 (Lodi) 0S-FR-602-94	WP	0.28		840	6	62 72	fruit	<0.02 <0.02
USA (NY), 1994 (McIntosh) 05-FR-003-94	WP	0.28		980	6	75	fruit fruit washed wet pomace juice	0.02 <0.02 0.049 <0.01
USA (NY), 1994 (McIntosh) 05-FR-003-94	WP	0.85		980	6	75	fruit fruit washed wet pomace juice	<0.02 0.027 0.10 <0.01
USA (NY), 1994 (McIntosh) 05-FR-003-94	WP	1.4		980	6	75	fruit fruit washed wet pomace juice	0.026 0.047 0.12 <0.01
USA (PA), 1994 (Tydeman's Red) NE-FR-807-94	WP	0.28		940	6	67	fruit	0.024
USA (WA), 1994 (Oregon Spur) 0W-FR-641-94	WP	0.56		940	6	74	fruit	0.034
USA (WA), 1994 (Oregon Spur) 0W-FR-641-94	WP	0.28		940	6	74 74	fruit fruit [1/] fruit washed wet pomace juice	0.02 <0.02 0.023 0.029 <0.01
USA (WA), 1994 (Oregon Spur) 0W-FR-641-94	WP	0.85		940	6	74 74	fruit fruit [1/] fruit washed wet pomace juice	0.12 0.066 0.070 0.28 <0.01
USA (WA), 1994 (Oregon Spur) 0W-FR-641-94	WP	1.4		940	6	74 74	fruit fruit [1/] fruit washed wet pomace juice	0.29 0.21 0.19 0.70 <0.01
USA (WA), 1994 (Red Delicious) 0W-FR-642-94	WP	0.28		940	6	72	fruit	<0.02
USA (WV), 1994 (Paula Red) NE-FR-304-94	WP	0.28		530	6	72	fruit	0.022

[1/] Fruit for processing.

Table 26. Cyprodinil residues in pears resulting from supervised trials in France, Italy, Spain and the USA.

PEARS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1997 (Williams) 2161/97	WG included fludioxonil	0.38	0.040	950	2 3	12 0 3 7 14 21	fruit	0.07 0.54 0.14 0.11 0.05 0.04
Italy, 1996 (Kaiser A) 2063/96	WG included fludioxonil	0.38		1200	2 3	11 0 7 14 21	fruit	0.27 0.59 0.46 0.33 0.22

PEARS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Italy, 1996 (Kaiser) 2064/96	WG included fludioxonil	0.38		1000	2 3	10 0 7 14 21	fruit	0.55 1.05 0.70 0.56 0.61
Italy, 1996 (Kaiser) 2065/96	WG included fludioxonil	0.38		1200	3	14	fruit	0.51
Italy, 1997 (Abate Fete) 2072/97	WG included fludioxonil	0.38	0.025	1500	2 3	12 0 7 14 21	fruit	0.11 0.26 0.26 0.13 0.10
Italy, 1997 (Williams) 2071/97	WG included fludioxonil	0.38	0.025	1500	3	14	fruit	0.03
Spain, 1997 (Blanquilla de Aranjuez), 2054/97	WG included fludioxonil	0.37	0.023-0.025	1430-1630	3	14	fruit	0.34
Spain, 1997 (Conference) 2055/97	WG included fludioxonil	0.37	0.020	1910	2 3	14 0 3 7 14 21 0 7 21	fruit	0.09 0.75 0.50 0.36 0.19 0.12 c <0.02 c 0.10 c <0.02
Spain, 2001 (Blanquilla) 2091/01	WG included fludioxonil	0.40	0.038	1070	2	7	fruit	0.51
Spain, 2001 (Blanquilla) 2090/01	WG included fludioxonil	0.38 +0.39	0.039 +0.032	1020 +1220	2	7	fruit	0.38
USA (CA), 1994 (Bartlett) 02-FR-032-94	WP	0.28		2700	6	72	fruit	<0.02
USA (CA), 1994 (Bartlett) 02-FR-032-94	WP	0.56		2700	6	72	fruit	<0.02
USA (CA), 1994 (Bartlett) OW-FR-404-94	WP	0.28		1200	6	72	fruit	<0.02
USA (NY), 1994 (Bosc) 05-FR-004-94	WP	0.28		980	6	73	fruit	<0.02
USA (NY), 1994 (Bosc) 05-FR-004-94	WP	0.56		980	6	73	fruit	<0.02
USA (WA), 1994 (Bosc) OW-FR-643-94	WP	0.28		940	6	72	fruit	0.027
USA (WA), 1994 (Bosc) OW-FR-643-94	WP	0.56		940	6	72	fruit	0.033
USA (WA), 1994 (Bartlett) OW-FR-644-94	WP	0.28		940	6	72	fruit	0.025
USA (OR), 1994 (Bosc) OW-FR-653-94	WP	0.28		940	6	72	fruit	<0.02

c: sample from control plot.

Table 27. Cyprodinil residues in stone fruit resulting from supervised trials in France, Germany, Greece, Italy, Switzerland and the USA.

STONE FRUIT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
APRICOTS								
France, 1999 (Héléna Roussillon) 2008/99	WG included fludioxonil	0.30	0.030	980	3	14	whole fruit juice pulp 3/	0.185 0.082 0.21

STONE FRUIT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Greece, 2000 (Harkot) 2084/00	WG	2×0.22 +1×0.36	2×0.015 +1×0.025	1460	3	7	flesh	0.22
Italy, 1997 (Bella di limola) 2068/97	WG included fludioxonil	0.3	2×0.03 +1×0.02	1000 +1000 +1500	2 3	51 0 7 14 21	fruit	<0.02 0.14 0.02 0.02 0.03
CHERRIES								
USA (CA), 1994 (Sweet Bing) 02-FR-036-94	WP	0.56		2700	5	1	fruit	0.40
USA (CA), 1994 (Sweet Bing) 02-FR-036-94	WP	1.1		2700	5	1	fruit	1.3
USA (MI), 1994 (Montmorency), tart. NE-FR-717-94	WP	0.56		700	5	1	fruit	1.5
USA (MI), 1994 (Montmorency), tart. NE-FR-717-94	WP	1.1		700	5	1	fruit	2.6
USA (MI), 1994 (Schmior Heiplefinger). NE-FR-716-94	WP	0.56		940	5	1	fruit	0.78
USA (NY), 1994 (Montmorency) tart. NE-FR-403-94	WP	0.56		470	5	1	fruit	0.68
USA (OR), 1994 (Sweet Bing) OW-FR-650-94	WP	0.56		940	5	1	fruit	1.7
USA (WA), 1994 (Sweet Bing) OW-FR-649-94	WP	0.56		940	5	1	fruit	1.5
USA (WA), 1994 (Sweet Bing) OW-FR-649-94	WP	1.1		940	5	1	fruit	2.2
USA (CA), 1995 (Bing) 02-FR-034-95	WP	0.56		2700	5	0 1 3	fruit fruit fruit	0.79 0.98 0.56
USA (MI), 1997 (Schmior) NE-FR-732-97	WG	0.56		930	5	1		0.58
USA (MI), 1997 (Schmior) NE-FR-732-97	WG	0.56		2800	5	1		0.46
USA (MI), 1998 (Napoleon) NE-FR-711-98	WG	0.56		650	5	1		1.4
USA (MI), 1998 (Napoleon) NE-FR-711-98	WG	0.56		1900	5	1		1.7
NECTARINES								
Italy, 1994 (Caldesi 84) 501/95	WG included fludioxonil	0.38	0.025	1500	1 2	7 7	whole fruit whole fruit	0.19 0.36
PEACHES								
France, 1994 (Queen Ruby) location: Pierrelatte OF94154, BY17	WG included fludioxonil	0.23		830	2 3	14 0 7 14 28	fruit fruit fruit fruit fruit	0.07 0.28 0.11 0.09 0.03
France, 1994 (Symphonie) location: Albias OF94154, LD73	WG included fludioxonil	0.23		930	2 3	14 0 5 14 28	fruit fruit fruit fruit fruit	0.1 0.21 0.18 0.06 0.03
Greece, 2000 (Red Haven) 2083/00	WG	2×0.22 +1×0.37	2×0.015 +1×0.025	1460	3	7	flesh	0.37
Greece, 2000 (Red Haven) 2031/99	WG	2×0.22 +1×0.37	2×0.015 +1×0.025	1460	3	7	flesh fruit, calc	0.14 0.13
Italy, 1996 (Fayette) 2058/96	WG included fludioxonil	0.30	0.03		2 3	7 0 7 14 21	fruit fruit fruit fruit fruit	0.31 0.89 0.58 0.45 0.46

STONE FRUIT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Italy, 2001 (Carson) 2048/01	WG included fludioxonil	0.38		1215	2	0 3 7 14	whole fruit whole fruit whole fruit whole fruit	0.84 0.49 0.45 0.30
Italy, 2001 (Flavorcrest) 2047/01	WG included fludioxonil	0.38		1200	2	0 3 7 14	whole fruit whole fruit whole fruit whole fruit	0.12 0.19 0.11 0.14
Italy, 2001 (Red Moon) 2045/01	WG included fludioxonil	0.38		1200	2	0 3 7 14	whole fruit whole fruit whole fruit whole fruit	0.44 0.27 0.11 0.12
Italy, 2001 (Stark Red Gold) 2046/01	WG included fludioxonil	0.38		1200	2	0 3 7 14	whole fruit whole fruit whole fruit whole fruit	0.18 0.19 0.16 0.20
USA (CA), 1994 (Springcrest) 02-FR-033-94	WP	0.56		2700	5	1	fruit	0.60
USA (CA), 1994 (Springcrest) 02-FR-033-94	WP	1.1		2700	5	1	fruit	0.99
USA (GA), 1994 (June Prince) 0S-FR-830-94	WP	0.56		930	5	1	fruit	0.59
USA (GA), 1994 (June Prince) 0S-FR-830-94	WP	1.1		930	5	1	fruit	1.3
USA (MI), 1994 (Canadian Harmony). NE-FR-714-94	WP	0.56		690	5	1	fruit	1.2
USA (PA), 1994 (Suncrest) NE-FR-808-94	WP	0.56		530	5	1	fruit	0.68
USA (WA), 1994 (Regina) OW-FR-645-94	WP	0.56		930	5	1	fruit	0.26
USA (CA), 1995 (Fay Elberta) 02-FR-035-95	WP	0.56		2700	5	0 1 3	fruit	0.81 0.88 0.64
USA (CA), 1995 (Loadell) OW-FR-420-95	WP	0.56			5	1	fruit	1.0
USA (NC), 1997 (Bell of Georgia). 0S-FR-604-97	WG	0.56		560	5	1		0.83
USA (NC), 1997 (Bell of Georgia). 0S-FR-604-97	WG	0.56		2300	5	1		1.3
USA (SC), 1997 (Sunbrite) 0S-FR-605-97	WG	0.56		490	5	1		0.92
USA (SC), 1997 (Sunbrite) 0S-FR-605-97	WG	0.56		2000	5	1		1.0
USA (TX), 1997 (Florida King) 0S-FR-201-97	WG	0.56		190	5	1		0.80
USA (TX), 1997 (Florida King) 0S-FR-201-97	WG	0.56		1900	5	1		0.67
PLUMS								
France, 1994 (707/GF801) OF94156 trial FP22	WG included fludioxonil	0.23		500	2 3	14 0 7 14 28		0.05 0.09 0.10 0.06 0.03
France, 1994 (President) OF94156 trial LD74	WG included fludioxonil	0.23		1000	2 3	14 0 7 14 28		0.07 0.19 0.19 0.13 0.07
France, 1998 (Plum d'Ente) 9812203	WG included fludioxonil	0.23	0.023	1000	3	14	flesh dried fruit	0.14 0.15

STONE FRUIT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1998 (Plum d'Ente) 9812204	WG included fludioxonil	0.23	0.023	1000	3	14	flesh dried fruit	0.08 0.10
Germany, 1998 (Cak-Cak's Beste) gr 91898	WG included fludioxonil	0.38		1500	3	0 7 10 14	flesh flesh flesh flesh 2/	0.13 0.13 0.15 0.13
Germany, 1998 (Hauszwetsche, Schäfer) gr 90898, processing study	WG included fludioxonil	0.38		1500	3	0 7 10 14	flesh flesh flesh flesh	0.62 0.21 0.27 0.17
Germany, 1998 (Hauszwetsche, Typ Schraderhof 100) gr 92998	WG included fludioxonil	0.28 +0.35 +0.29		1270 +1550 +1270	3	0 7 10 14	flesh flesh flesh flesh	0.52 0.30 0.39 0.31
Germany, 2000 (Hauszwetsche) gr 36800	WG included fludioxonil	0.38		1500	3	0 14	flesh flesh 2/	0.35 0.19
Italy, 2000 (Regina) 2102/00	WG included fludioxonil	0.37	0.037	1000	3	0 7 14 21		0.12 0.09 0.13 0.09
Italy, 2000 (Black Star) 2103/00	WG included fludioxonil	0.38	0.038	1000	3	14	fruit	0.23
Italy, 2001 (Angelina) 2089/01	WG included fludioxonil	0.38	0.031	1200	2	0 3 7 14 21	whole fruit whole fruit whole fruit whole fruit whole fruit	0.08 0.11 0.12 0.07 0.06
Switzerland, 1997 (Fellenberg) 2342/97	WG included fludioxonil	0.34	0.023	1500	2 3	10 0 7 11 14	flesh flesh flesh flesh flesh	0.19 0.59 0.40 0.32 0.20
Switzerland, 1997 (Fellenberg) 2343/97	WG included fludioxonil	0.34	0.023	1500	2 3	10 0 7 11 14	flesh flesh flesh flesh flesh	0.21 0.75 0.42 0.46 0.44
Switzerland, 1997 (Fellenberg) 2344/97	WG included fludioxonil	0.34	0.023	1500	2 3	11 0 7 10 14	flesh flesh flesh flesh flesh	0.08 0.51 0.26 0.26 0.24
Switzerland, 2000 (Fellenberg). 2012/00	WG included fludioxonil	0.23	0.024	930	3	14	fruit 1/	0.14
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	0.56		2700	5	1	fruit	0.19
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	1.12		2700	5	1	fruit	0.30
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	1.7		2700	5	1	fruit	0.37
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	2.8		2700	5	1	fruit	1.3
USA (CA), 1994 (Santa Rosa) 02-FR-034-94	WP	0.56		2700	5	1	fruit	0.067
USA (CA), 1994 (Santa Rosa) 02-FR-034-94	WP	1.1		2700	5	1	fruit	0.25
USA (CA), 1995 (French Prunes) OW-FR-421-95	WP	0.56		1860	5	1	fruit	0.50

STONE FRUIT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995 (French Prunes) 02-FR-036-95	WP	0.56		2700	5	0 1 3	fruit fruit fruit	0.41 0.43 0.29
USA (ID), 1994 (Friar) OW-FR-647-94	WP	0.56		900	5	1	fruit	0.080
USA (MI), 1994 (Stanley Prune) NE-FR-715-94	WP	0.56		780	5	1	fruit	0.65
USA (MI), 1994 (Stanley Prune) NE-FR-715-94	WP	1.1		780	5	1	fruit	0.90
USA (OR), 1994 (Brooks Prunes) OW-FR-648-94	WP	0.56		1500	5	1	fruit	0.10
USA (OR), 1994 (Brooks Prunes) OW-FR-648-94	WP	1.12		1500	5	1	fruit	0.36
USA (OR), 1994 (Brooks Prunes) OW-FR-648-94	WP	1.7		1500	5	1	fruit	0.37
USA (OR), 1994 (Brooks Prunes) OW-FR-648-94	WP	2.8		1500	5	1	fruit	1.0
USA (OR), 1994 (Italian) OW-FR-646-94	WP	0.56		910	5	1	fruit	0.54
USA (OR), 1994 (Prunes, Brooks). OW-FR-648-94	WP	0.56		1500	5	3	fruit	0.11
USA (OR), 1994 (Prunes, Brooks). OW-FR-648-94	WP	1.7		1500	5	3	fruit	0.23
USA (OR), 1994 (Prunes, Brooks). OW-FR-648-94	WP	2.8		1500	5	3	fruit	0.62
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	0.56		2700	5	1	fruit	0.22
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	1.7		2700	5	1	fruit	0.82
USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	2.8		2700	5	1	fruit	1.2

[1/] The weight of stones was 5.5% of the fruit weight.
[2/] Only the flesh of the fruits was analyzed. The weight of the stones was about 3-6% of the fruit weight.
[3/] The apricots were washed and stones removed. The apricot pulp was converted to juice using a food processor. The residue level in whole fruit was calculated from the residue level in the pulp, allowing for weight of stones.

Table 28. Cyprodinil residues in grapes resulting from supervised trials in Chile, France, Germany, Italy, South Africa, Spain, Switzerland and the USA.

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Chile, 1996 (Thompson Seedless) 2226/95	WG included fludioxonil	0.30 +0.37	0.037 +0.030	800 +1240	2	7 7 7	grapes raisins [3/] grape juice [4/]	0.25 1.0 0.04
Chile, 1996 (Thompson Seedless) 2224/95	WG included fludioxonil	0.30 +0.37	0.036 +0.030	800 +1240	2	7 7 7	grapes raisins [3/] grape juice [4/]	0.45 1.5 0.058
Chile, 1996 (Thompson Seedless) 2218/95	WG included fludioxonil	0.30 +0.38	0.024 +0.025	1230 +1520	2	7 7 7	grapes raisins [5/] grape juice [4/] grape juice	0.51 0.45 0.090 (c 0.005)
Chile, 1996 (Thompson Seedless) 2219/95	WG included fludioxonil	0.29 +0.37	0.030 +0.025	980 +1500	2	7 7 7	grapes raisins [5/] grape juice [4/] grape juice	0.40 0.52 0.079 (c 0.005)
Chile, 1996 (Thompson Seedless) 2220/95	WG included fludioxonil	0.29 +0.38	0.030 +0.025	980 +1510	2	21 21 21	grapes raisins [5/] grape juice [4/] grape juice	0.36 0.44 0.070 (c 0.005)

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Chile, 1996 (Thompson Seedless) 2227/95	WG included fludioxonil	0.30 +0.37	0.037 +0.030	810 +1220	2	21 21 21	grapes raisins [3/] grape juice [4/]	0.52 1.3 0.048
Chile, 1996 (Thompson Seedless) 2225/95	WG included fludioxonil	0.30 +0.35	0.034 +0.030	880 +1160	2	21 21 21	grapes raisins [3/] grape juice [4/]	0.30 1.1 0.030
Chile, 1996 (Thompson Seedless) 2222/95	WG included fludioxonil	0.59 +0.74	0.054 +0.048	1100 +1600	2	7 7 7	grapes juice raisins	0.53 0.085 0.68 [1/]
Chile, 1996 (Thompson Seedless) 2223/95	WG included fludioxonil	0.59 +0.78	0.045 +0.048	1300 +1600	2	21 21 21	grapes juice raisins	0.59 0.070 0.97 [1/]
Chile, 1996 (Thompson Seedless) 2228/95	WG included fludioxonil	0.59 +0.74	0.074 +0.060	800 +1200	2	7 7 7	grapes juice raisins [3/]	1.3 0.18 2.3
Chile, 1996 (Thompson Seedless) 2229/95	WG included fludioxonil	0.60 +0.69	0.074 +0.060	800 +1200	2	21 21 21	grapes juice raisins [3/]	0.89 0.086 2.0
France, 1993 (Meunier 41 B) OF93157 trial DE90	WG	0.38		200	1	0 14 28 42 66 66	grapes grapes grapes grapes mature grapes wine	0.33 0.13 0.09 0.18 0.15 0.02
France, 1994 (Cabernet Franc) OF94143 trial TP87	WG included fludioxonil	0.45		150	1	70	grapes wine juice must	0.16 0.02 0.02 0.12
France, 1994 (Cabernet Franc) OF94141 trial TP86	WG	0.50		150	1	70	grapes must red wine pomace pomace	0.05 0.04 <0.01 0.28 c 0.05
France, 1994 (Carignan/Monticola) OF94141 trial BY14	WG	0.50		130	1	60	grapes must red wine pomace pomace	0.18 0.15 0.01 7.9 c 0.06
France, 1994 (Carignan) OF94141 trial AC19	WG	0.50		200	1	77	grapes must red wine pomace	0.06 0.04 <0.01 2.6
France, 1994 (Chardonnay) OF94141 trial GD87	WG	0.50		150	1	64	grapes must white wine pomace pomace	0.33 0.05 0.02 4.8 c 0.07
France, 1994 (Gamay) OF94141 trial SJ82	WG	0.67		160	1	71	grapes must red wine pomace	0.36 0.34 0.06 7.5
France, 1994 (Meunier) OF94141 trial DE19	WG	0.50		150	1	76	grapes must white wine pomace	0.12 0.16 0.01 4.3
France, 1994 (Pinot Noir) OF94141 trial LA21	WG	0.50		110	1	73	grapes must red wine pomace	0.02 <0.02 <0.01 0.26

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1994 (Tranpramilo) OF94143 trial FP17	WG included fludioxonil	0.45		100	1	55	grapes wine juice must	0.17 0.02 0.02 0.13
France, 1994 (Tranpramilo) OF94143 trial LA20	WG included fludioxonil	0.45		110	1	73	grapes wine juice must	0.24 0.01 <0.01 0.14
France, 1994 (Ugin Blanc) OF94141 trial TH87	WG	0.50		150	1	89	grapes must white wine pomace pomace	0.37 0.22 0.06 12 c 0.09
France, 1994 (Ugni Blanc) OF94143 trial TH88	WG included fludioxonil	0.45		150	1	89	grapes wine juice must	0.31 0.04 0.03 0.11
France, 1995 (Cabernet Franc) OF95123 trial TP14	WG included fludioxonil	0.45		200	1	66	grapes wine	0.36 0.02
France, 1995 (Carignan/Monticola) OF95123 trial BY87	WG included fludioxonil	0.45		130	1	72	grapes wine	0.29 0.02
France, 1995 (Garnay) OF95122 trial KJ47	WG included fludioxonil	0.45		200	1	42 56 63 70 70	grapes grapes grapes grapes wine	0.78 0.68 0.56 0.49 0.09
France, 1995 (Garnay) OF95123 trial KJ46	WG included fludioxonil	0.45		200	1	70	grapes wine	0.44 0.08
Germany, 1994 (Dornfelder) 2154/94	WG included fludioxonil	0.38		800	1 2	18 0 14 29 34 43 34 34 34	grapes grapes grapes grapes grapes grapes must wine wine	0.58 (c 0.01) 1.1 0.85 0.51 0.61 0.47 0.022 0.005 0.005
Germany, 1994 (Kerner) 2153/94	WG included fludioxonil	0.38		800	1 2	18 0 14 29 34 43 34 34 34	grapes grapes grapes grapes grapes grapes must wine wine	0.46 0.98 0.99 0.72 0.58 0.59 0.059 <0.005 <0.005
Germany, 1995 (Dornfelder) gr 51295	WG included fludioxonil	0.45	0.056	800	2	0 13 28 36 41 36 36 36	grapes grapes grapes grapes grapes must wine (157 d) wine (435 d)	1.6 0.96 0.71 0.69 0.65 0.047 0.007 <0.005

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1995 (Müller-Thurgau) gr 51095	WG included fludioxonil	0.45	0.056	800	2	0 13 28 34 41 35 35 35	grapes grapes grapes grapes grapes must wine (157 d) wine (435 d)	1.0 0.75 0.65 0.47 0.54 0.047 <0.005 <0.005
Germany, 1995 (Scheurebe) gr 51195	WG included fludioxonil	0.45	0.056	800	2	0 13 28 34 41 35 35 35 wine	grapes grapes grapes grapes grapes must wine (157 d) wine (435 d)	1.0 0.97 0.80 0.64 0.55 0.090 <0.005 <0.005 c 0.01
Germany, 1999 (Kerner) gr 42899 2153/99	WG included fludioxonil	0.45		2000	2	0 21 35 42	grapes unripe grapes unripe grapes ripe grapes ripe	0.51 0.26 0.33 0.25
Italy, 1993 (Schiava) 2105/93	WG included fludioxonil	0.38	0.038	1000	2	0 7 14 28 42	grapes grapes grapes grapes grapes	0.63 (c 0.01) 0.65 0.88 0.51 0.33 (c 0.01)
Italy, 1994 (Trebbiano Romagnolo) 2109/94	WG included fludioxonil	0.38	0.038	1000	2	0 7 14 21 21 21 21	grapes grapes grapes grapes must young wine wine	0.85 1.0 1.0 0.75 0.019 0.020 0.012
Italy, 1996 (Moscato) 2066/96	WG included fludioxonil	0.38		700	1 2	49 0 14 21 28 28 28 28	grapes grapes grapes grapes grapes must wine young wine	0.42 1.5 0.57 0.64 0.64 0.067 0.042 0.036
South Africa, 1991 (Alphonse Lavalle) 2140/90. [6/]	EC	0.25	0.025	1000	3 4	14 0 3 7 14 21 28	grapes grapes grapes grapes grapes grapes grapes	0.42 0.59 0.49 0.57 0.39 0.52 0.25
South Africa, 1991 (Chenin Blanc) 2141/90. [2/]	EC	0.089	0.013	710	3 4	14 0 3 7 14 21 28 wine	grapes grapes grapes grapes grapes grapes grapes	0.42 1.0 0.68 0.88 0.56 0.48 0.44 0.011

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
South Africa, 1991 (Sauvignon Blanc) 2143/90. [2/]	EC	0.25	0.025	1000	3 4	14 0 3 7 14 21 28 	grapes grapes grapes grapes grapes grapes grapes wine	0.46 0.73 0.93 0.76 0.44 0.44 0.37 0.006
South Africa, 1992 (Queen of the Vineyard) 2114/92	WG	0.25	0.025	1000	1 2	22 0 3 7 14 21 48	grapes grapes grapes grapes grapes grapes grapes	0.23 1.3 0.74 0.41 0.22 0.18 0.05
South Africa, 1992 (Waltam Cross) 2113/92	WG	0.25	0.025	1000	1 2	14 0 3 7 14 21 76	grapes grapes grapes grapes grapes grapes grapes	0.40 (c 0.01) 1.1 0.80 0.45 0.19 0.12 0.02
South Africa, 1997 (S.A. Riesling) 2408/97	WG included fludioxonil	0.30	0.03	1000	1 2	59 0 3 7 14 21 28 20	grapes grapes grapes grapes grapes grapes grapes wine	0.11 0.41 0.42 0.53 0.31 0.20 0.36 0.009
South Africa, 1998 (Colombar) 2406/97	WG included fludioxonil	0.15	0.015	1000	1 2	58 0 3 7 14 21 28 32 32	grapes grapes grapes grapes grapes grapes grapes grapes wine	0.09 0.28 0.19 0.23 0.15 0.11 0.11 0.10 0.006
Spain, 1994 (Macabeo) 2101/94	WG included fludioxonil	0.38	0.025	1520	2	0 12 19 26 22 26 26	grapes grapes grapes grapes juice must wine	1.8 0.98 1.1 0.93 0.22 (c 0.011) 0.067 0.049
Spain, 1995 (Macabeo) 2016/95	WG included fludioxonil	0.38	0.057	660	2	21	grapes	2.1 (c 0.01)
Spain, 1995 (Malvasia) 2015/95	WG included fludioxonil	0.38		600	2	14	grapes	0.48
Spain, 1996 (Macabeo) 2008/96	WG included fludioxonil	0.35 +0.39	0.058 +0.058	610 +680	1 2	35 0 7 14 21 28 28 28	grapes grapes grapes grapes grapes grapes must wine	0.27 3.2 1.9 1.0 0.70 0.59 0.13 0.041

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Spain, 1996 (Mazuelo) 2007/96	WG included fludioxonil	0.38 +0.38	0.076 +0.046	500 +830	1 2	47 0 7 14 21 28 28 28	grapes grapes grapes grapes grapes grapes must wine	0.09 1.2 0.88 0.29 (c 0.01) 0.34 0.54 (c 0.01) 0.13 (c 0.005) 0.044
Spain, 2001 (Tempranillo) 2099/01	WG included fludioxonil	0.37	0.038	1000	2	0 21	grapes grapes	1.1 0.39
Switzerland, 1989 (Blauburgunder) 2110/89	WP	0.50		1000	4	0 14 28 42	grapes grapes grapes grapes	4.8 (c 0.011) 3.8 2.1 2.2
Switzerland, 1989 (Gamay) 2111/89	WP	0.50		1000	3	0 14 28	grapes grapes grapes	4.8 (c 0.025) 1.9 1.6 (c 0.025)
Switzerland, 1990 (Blauburgunder) 2119/90. [6/]	WP	0.50			4	49	grapes wine (68d) wine (222 d) wine wine	1.6 (c 0.011) 0.24 0.20 c <0.005 c 0.005
Switzerland, 1990 (Gamay) 2121/90. [6/]	WP	0.50			4	30	grapes wine (44d) wine (206 d) wine wine	3.3 (c <0.01) 0.17 0.13 c 0.014 c 0.005
Switzerland, 1990 (Gamay) 2122/90. [6/]	WP	0.50			2	55	grapes wine (69d) wine (231 d)	3.5 0.20 0.18
Switzerland, 1991 (Chasselas) 2042/91	WP	0.50	0.025	2000	1	0 40	grapes grapes wine (48 d) wine (106 d)	1.3 0.51 0.042 0.037
Switzerland, 1991 (Pinot Noir) 2043/91	WP	0.50	0.025	2000	2	0 41	grapes grapes wine (48 d) wine (106 d)	1.9 1.4 0.099 0.086
Switzerland, 1994 (Chasselas) 2058/94	WG included fludioxonil	0.45	0.056	800	2	0 35 42 49 49 49 49	grapes grapes grapes grapes juice wine (61 d) wine (222 d)	5.5 (c 0.02) 1.1 (c 0.01) 1.5 0.94 0.15 0.12 0.022
Switzerland, 1994 (Chasselas) 2059/94	WG included fludioxonil	0.45	0.056	800	2	0 36 43 49 49 49 49	grapes grapes grapes grapes juice wine (62 d) wine (223 d)	3.7 1.3 1.2 1.5 0.10 0.08 0.006

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Switzerland, 1994 (Chasselas) 2047/94	WG included fludioxonil	0.45	0.056	800	2	49	grapes	1.2
Switzerland, 1994 (Pinot Noir) 2057/94	WG includes fludioxonil	0.45	0.056	800	2 [2/]	0 35 42 50 50 50 50	grapes grapes grapes grapes juice wine (61 d) wine (222 d)	7.0 2.2 1.5 1.9 0.25 0.16 0.22
Switzerland, 1994 (Pinot Noir) 2037/94	WG included fludioxonil	0.45	0.056	800	2 [2/]	52	grapes	0.79
Switzerland, 1995 (Chasselas) 2047/95	WG included fludioxonil	0.45	0.056	800	2	45	grapes	1.8
Switzerland, 1995 (Chasselas) 2049/95	WG included fludioxonil	0.45		800	1 2	43 0 14 28 35 42 35 35 35	grapes grapes grapes grapes grapes grapes juice wine (44 d) wine (210 d)	0.36 2.91 (c 0.02) 1.8 (c0.01) 1.2 1.4 0.62 (c 0.02) 0.14 0.16 0.006
Switzerland, 1995 (Pinot Noir) 2037/95	WG included fludioxonil	0.45	0.056	800	2	46	grapes	1.1 (c 0.17)
Switzerland, 1995 (Pinot Noir) 2050/95	WG included fludioxonil	0.45		800	1 2	43 0 14 28 35 42 35 35 35	grapes grapes grapes grapes grapes grapes juice wine (44 d) wine (210 d)	0.74 4.5 (c 0.01) 2.4 (c 0.01) 2.2 2.2 1.5 (c 0.02) 0.45 0.30 0.18
Switzerland, 1996 (Chasselas) 2047/96	WG included fludioxonil	0.45	0.056	800	2	48	grapes	1.1
Switzerland, 1996 (Pinot Noir) 2037/96	WG included fludioxonil	0.45	0.056	800	2	48	grapes	1.5
Switzerland, 1997 (Pinot Noir) 2037/97	WG included fludioxonil	0.45	0.056	800	2	44	grapes	0.93
USA (CA), 1995 (Cabernet Sauvignon). OW-FR-428-95	WP	0.56		470	4	0 7	grapes grapes	0.67 0.48
USA (CA), 1995 (Chardonnay) OW-FR-427-95	WP	0.56		470	4	0 7	grapes grapes	1.1 0.95
USA (CA), 1995 (Johannesburg Riesling). OW-FR-521-95	WP	0.56		940	4	0 9	grapes grapes	0.70 0.52
USA (CA), 1995 (Sauvignon Blanc) OW-FR-429-95	WP	0.56		470	4	0 7	grapes grapes	0.58 0.82
USA (CA), 1995 (Thompson Seedless)OW-FR-425-95	WP	0.56		560	4	0 7 7	grapes grapes raisins	1.9 1.4 1.4
USA (CA), 1995 (Thompson Seedless) OW-FR-425-95	WP	1.7		560	4	0 7 7	grapes grapes raisins	4.8 2.8 5.6
USA (CA), 1995 (Thompson Seedless) OW-FR-425-95	WP	2.8		560	4	0 7 7	grapes grapes raisins	13.9 8.9 20.1

GRAPES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995 (Thompson Seedless) 02-FR-038-95	WP	0.56		470	4	0	grapes	0.85
						1	grapes	0.70
						3	grapes	0.61
						7	grapes	0.66
						14	grapes	0.50
						7	raisins	0.70
						7	fruit unw'd	0.33
						7	wet pomace	7.5
						7	dry pomace	22
						7	juice	0.082
USA (CA), 1995 (Thompson Seedless) 02-FR-038-95	WP	1.7		470	4	0	grapes	2.5
						7	grapes	2.4
						7	fruit unw'd	2.2
						7	wet pomace	48
						7	dry pomace	104
						7	juice	0.458
USA (CA), 1995 (Thompson Seedless) 02-FR-038-95	WP	2.8		470	4	0	grapes	4.0
						7	grapes	4.7
						7	fruit unw'd	4.5
						7	wet pomace	91
						7	dry pomace	206
						7	juice	0.73
USA (CA), 1995 (Thompson Seedless) OW-FR-426-95	WP	0.56		560	4	0	grapes	1.7
						1	grapes	1.7
						3	grapes	1.5
						7	grapes	1.8
						14	grapes	1.2
USA (CA), 1995 (Thompson) OW-FR-522-95	WP	0.56		700	4	0	grapes	0.86
						7	grapes	0.94
USA (NY), 1995 (Catawba) NE-FR-804-95	WP	0.56		940	4	7	grapes	1.3
USA (OR), 1995 (Merlot) OW-FR-613-95	WP	0.56		940	4	0	grapes	0.82
						7	grapes	0.96
USA (PA), 1995 (Concord) NE-FR-805-95	WP	0.56		910 +880 +850 +840	4	0	grapes	0.94
						7	grapes	0.85
USA (WA), 1995 (Sangiavas) OW-FR-612-95	WP	0.56		940	4	0	grapes	<0.02
						7	grapes	<0.02

[1/] Raisins produced by local method, sun-dried 20-30 days after harvest. Approximately 16 kg of grapes were spread out on cardboard and sun dried with turning 2 or 3 times per day.

[2/] Analytical report only. No information which grapes were the source of the wine.

[3/] Raisin production. 16 kg grapes were washed with 1 % aqueous NaOH at 80°C, then with cold water. Grapes were treated with sulphur (dioxide?) gas for 8 hours, then oven-dried at 65°C for 35 hours to reach 14 % moisture, then air-drying.

[4/] Grape juice. Hydraulic press production as in household.

[5/] Raisin production. Approximately 16 kg grapes were spread out on cardboard and sun-dried on site. The grapes/raisins were turned 2 or 3 times per day. Raisins were sampled after 22 days drying.

[6/] Analytical report only.

c: sample from control plot.

Table 29. Cyprodinil residues in strawberries resulting from supervised trials in France, Germany, Italy, Spain, Switzerland and USA.

STRAWBERRIES	Application					PHI,	Commodity	Residues,
Location, year (variety), report No.	Form	kg ai/ha	kg ai/hl	water, l/ha	no.	days		mg/kg
France, 1995 (Chandler)	WG included	0.38		500	2	13	fruit	0.52
OF95116/AC97	fludioxonil				3	0	fruit	0.93
						3	fruit	1.2
						7	fruit	0.37
						10	fruit	0.52
						14	fruit	0.65
France, 1995 (Pandora)	WG included	0.38		500	2	11	fruit	0.07
OF95116 trial DE98	fludioxonil				3	0	fruit	0.16
						3	fruit	0.10
						7	fruit	0.10
						10	fruit	0.08
						14	fruit	0.06
France, 2000 (Gariguette)	WG included	0.38	0.094	400	4	0	fruit	0.49
0011102	fludioxonil					3	fruit	0.32
						7	fruit	0.22
France, 2001 (Diamante),	WG included	0.39	0.094	410	3	0	fruit	0.92
greenhouse	fludioxonil	+0.37	+0.094	+400		3	fruit	0.27
0110302		+0.35	+0.094	+370				
France, 2001 (Diamante),	WG included	0.37	0.094	390	3	0	fruit	0.32
greenhouse	fludioxonil	+0.36	+0.094	+380		3	fruit	0.25
00110301		+0.35	+0.094	+380				
France, 2001 (Mamie)	WG included	0.38	0.094	400	3	0	fruit	0.47
00110402	fludioxonil					3	fruit	0.33
France, 2001 (Mara Style)	WG included	0.39	0.094	420	3	0	fruit	0.49
00110401	fludioxonil					3	fruit	0.41
France, 2000 (Chandler),	WG included	0.38	0.094	400	3	0	fruit	0.71
greenhouse	fludioxonil					3	fruit	0.43
0011101						7	fruit	0.27
						3	fruit	c 0.02
Germany, 1995 (Elisant)	WG included	0.36		1070	3	0	fruit	0.61
95011R	fludioxonil					3	fruit	0.29
						5	fruit	0.15
						7	fruit	0.09
						10	fruit	0.07
						12	fruit	0.05
Germany, 1995 (Korona)	WG included	0.38		2000	3	0	fruit	0.45
FR12/95/35	fludioxonil					3	fruit	0.18
						5	fruit	0.13
						7	fruit	0.08
						10	fruit	0.10
						12	fruit	0.06
Germany, 1995 (Korona)	WG included	0.38		2000	3	0	fruit	0.29
FR12/95/44	fludioxonil					3	fruit	0.11
						5	fruit	0.11
						7	fruit	0.10
						10	fruit	0.06
						12	fruit	0.06
Germany, 1996 (Senga-Sengana)	WG included	0.38		2000	3	10	fruit	0.21
2187/96	fludioxonil							
Germany, 1996 (Korona)	WG included	0.38		2000	3	10	fruit	0.53
2188/96	fludioxonil							
Italy, 2001 (Onda), greenhouse	WG included	0.36	0.038	960	3	0	fruit	0.50
2050/01	fludioxonil	+0.38	+0.038	+1010		3	fruit	0.30
		+0.36	+0.038	+960				

STRAWBERRIES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Spain, 1994 (Oso Grande), under plastic 2014/94	WG included fludioxonil	0.38	0.032	1150	3	0 3 7 14	fruit fruit fruit fruit	1.7 1.2 0.86 0.57
Spain, 1994 (Tulda), under plastic 2013/94	WG included fludioxonil	0.38	0.032	1180	3	0 3 7 14	fruit fruit fruit fruit	2.7 2.2 1.9 1.0
Spain, 2001 (Camarrosa), greenhouse 2056/01	WG included fludioxonil	0.37 +0.36 +0.35	0.037 +0.037 +0.037	990 +960 +940	3	0 3	fruit fruit	1.1 0.75
Spain, 2001 (Camarrosa), greenhouse 2055/01	WG included fludioxonil	0.36 +0.37 +0.37	0.037 +0.037 +0.037	960 +980 +980	3	0 3	fruit fruit	0.55 0.42
Switzerland, 1995 (Elsenta) 2052/95	WG included fludioxonil	0.38	0.078	800	3	0 3 6 8 10 13	fruit	0.38 c 0.02 0.33 0.18 0.18 0.24 0.12 c <0.02
Switzerland, 1995 (Elvira) 2051/95	WG included fludioxonil	0.38	0.078	800	3	0 3 5 7 10 12	fruit	0.97 0.36 0.34 0.25 0.20 0.24
USA (CA), 1996 (592) OW-FR-515-96	WP + fludioxonil WP	0.56		940	6	0 3	fruit fruit	2.4 2.4
USA (CA), 1996 (Camarosa) 02-FR-010-97	WP + fludioxonil WP	0.56		470	6	0	fruit	1.8
USA (CA), 1996 (Chandler) OW-FR-516-96	WP + fludioxonil WP	0.56		710	6	0	fruit	2.2
USA (CA), 1996 (Chandler) OW-FR-564-96	WP + fludioxonil WP	0.56		700	6	0	fruit	0.98
USA (FL), 1996 (Oso Grande) 07-FR-002-96	WP + fludioxonil WP	0.56		800	6	0	fruit	1.7
USA (MI), 1996 (Allstar) NE-FR-709-96	WP + fludioxonil WP	0.56		480	6	0 6	fruit fruit	0.74 0.30
USA (NC), 1996 (Chandler) OS-FR-602-96	WP + fludioxonil WP	0.56		470	6	0	fruit	2.9
USA (NY), 1996 (Tribute) NE-FR-818-96	WP + fludioxonil WP	0.56		470	6	0	fruit	1.7
USA (OR), 1996 (Totem) OW-FR-611-96	WP + fludioxonil WP	0.56		750	6	0	fruit	1.5

c: sample from control plot.

Table 30. Cyprodinil residues in raspberries resulting from supervised trials in Germany.

RASPBERRIES Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 2000 (Autumn Bliss) gr 39800	WG included fludioxonil	0.38		2000	3	0 7 10 14 21	fruit, unripe fruit, unripe fruit, unripe fruit, ripe fruit, ripe	0.95 0.58 0.33 0.23 0.16
Germany, 2000 (Rumiloba) gr 40900	WG included fludioxonil	0.38		2050	3	0 7 10 13 21	fruit, unripe fruit, fruit, fruit, ripe fruit, ripe	2.3 1.2 0.49 0.26 0.11
Germany, 1999 (Himboqueen) gr 94999	WG included fludioxonil	0.37		2000	3	0 7 10 14	fruit, unripe fruit, unripe fruit, unripe fruit, ripe	4.7 0.93 0.39 0.38
Germany, 1999 (Autumn Bliss) gr 93899	WG included fludioxonil	0.38		2000	3	0 7 10 14	fruit, unripe fruit, unripe fruit, ripe fruit, ripe	1.9 0.57 0.55 0.26

Table 31. Cyprodinil residues in onions resulting from supervised trials in France, Germany and Italy.

ONIONS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1999 (Cévennes) 2071/99	WG included fludioxonil	0.39	0.094	410	3	0 3 7 14 21	bulb bulb bulb bulb bulb	0.08 0.03 <0.02 <0.02 <0.02
France, 2000 (Aldobo) 0010902	WG included fludioxonil	0.38	0.094	400	3	0 3 7 14 21	bulb bulb bulb bulb bulb	0.08 0.09 0.07 <0.02 <0.02
France, 2000 (Corona) 0011001	WG included fludioxonil	0.38	0.094	400	3	7	bulb	<0.02
France, 2000 (Rocodoro) 0010901	WG included fludioxonil	0.38	0.094	400	3	0 3 7 14 21	bulb bulb bulb bulb bulb	<0.02 <0.02 <0.02 <0.02 <0.02
Germany, 1999 (Elsa) gr 33999	WG included fludioxonil	0.31		620	3	0 7 13 20 27	whole plant whole plant bulb bulb bulb	1.7 0.36 0.02 <0.02 <0.02
Germany, 1999 (Stuttgarter Riesen) gr 32899	WG included fludioxonil	0.32		630	3	0 7 14 21 28	whole plant whole plant bulb bulb bulb	1.5 0.16 <0.02 <0.02 <0.02
Germany, 2000 (Hilton) gr 34200	WG included fludioxonil	0.38		1000	3	0 7 14 14 20 27	whole plant whole plant whole plant bulb bulb bulb	1.9 0.37 0.28 0.05 0.02 0.02

ONIONS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 2000 (Stuttgarter Riesen) gr 35800	WG included fludioxonil	0.41		650	3	0 7 14 14 21 28	whole plant whole plant whole plant bulb bulb bulb	4.4 0.31 0.11 0.02 0.03 0.02
Italy, 1999 (Rojo Duro) 2072/99	WG included fludioxonil	0.38	0.038	1000	3	0 3 7 14 21	bulb bulb bulb bulb bulb	0.05 <0.02 <0.02 <0.02 <0.02
Italy, 1999 (Rojo Duro) 2073/99	WG included fludioxonil	0.38	0.038	1000	3	7	bulb	<0.02
Italy, 2000 (Borretana Gialla) 2032/00. [1/]	WG included fludioxonil	0.38	0.038	1000	3	0 3 7 14	bulb bulb bulb bulb	0.12 0.04 0.03 0.02
Italy, 2000 (Borretana Gialla) 2033/00. [1/]	WG included fludioxonil	0.38	0.038	1000	3	0 7	bulb bulb	0.28 0.08

[1/] Trials 2032 and 2033 appeared to be replicate plots with the same spraying operation.

Table 32. Cyprodinil residues in cucumbers resulting from supervised trials in Greece, Spain and Switzerland.

CUCUMBERS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Greece, 1995 (Danimas) 2024/95	WG included fludioxonil	0.38		1000	2 3	14 0 3 7 14	fruit fruit fruit fruit fruit	0.02 1.1 0.15 0.04 <0.02
Greece, 1996 (Biri) greenhouse 2101/96	WG included fludioxonil	0.38	0.023	1600	2 3	14 0 3 7 14	fruit fruit fruit fruit fruit	0.04 0.38 0.19 0.09 0.05
Spain, 1995 (Bellisima) 2184/95	WG included fludioxonil	0.38		1500	3	0 3 7 14	fruit fruit fruit fruit	0.33 0.17 0.10 0.04
Spain, 1995 (Peto 025) 2014/95	WG included fludioxonil	0.38	0.025	1500	3	0 3 7 14	fruit fruit fruit fruit	0.13 0.03 <0.02 <0.02
Spain, 1996 (Regal) greenhouse 2005/96	WG included fludioxonil	0.38		1130 +1380 +1630	2 3	10 0 3 7 14	fruit fruit fruit fruit fruit	0.04 0.26 0.13 0.07 0.02
Spain, 1999 (Albatross) greenhouse 2166/99	WG included fludioxonil	0.37		980	3	0 3 7 14	fruit fruit fruit fruit	0.17 0.13 0.12 0.06
Spain, 1999 (Toril) greenhouse 2167/99	WG included fludioxonil	0.37		980	3	0 3 7 14	fruit fruit fruit fruit	0.22 0.13 0.10 0.06
Spain, 2000 (Rayo) greenhouse 2031/00	WG included fludioxonil	0.38 +0.38 +0.40	0.036 +0.036 +0.036	1050 +1050 +1120	3	0 7	fruit fruit	0.11 0.05

CUCUMBERS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Spain, 2000 (Toril) greenhouse 2030/00	WG included fludioxonil +0.38 +0.33	0.38 +0.38 +0.33	0.038 +0.038 +0.038	980 +1000 +870	3	0 7	fruit fruit	0.10 0.07
Switzerland, 1995 (Thyria F1) greenhouse 2054/95	WG included fludioxonil	0.38		1500	3	0 7 14 21	fruit fruit fruit fruit	0.28 0.12 0.03 0.02
Switzerland, 1995 (Thyria F1) greenhouse 2053/95	WG included fludioxonil	0.38		1500	3	0 7 14 21	fruit fruit fruit fruit	0.21 0.05 <0.02 <0.02

Table 33. Cyprodinil residues in egg plants resulting from supervised trials in Italy and Spain.

EGG PLANTS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Italy, 1997 (Napoletana), greenhouse 2074/97	WG included fludioxonil +0.38 +0.38	0.38 +0.38 +0.38	0.047 +0.047 +0.042	800 +800 +900	2 3	14 0 3 7 14	fruit fruit fruit fruit fruit	<0.02 0.23 0.16 0.08 0.03
Italy, 1997 (Violetta), greenhouse 2073/97	WG included fludioxonil	0.38	0.038	1000	2 3	13 0 3 7 14	fruit fruit fruit fruit fruit	0.02 0.07 0.04 0.02 <0.02
Spain, 1999 (Cava F1), greenhouse 2013/99	WG included fludioxonil	0.38	0.038	990	3	0 7	fruit fruit	0.14 0.06
Spain, 1999 (Cava), greenhouse 2014/99	WG included fludioxonil +0.38 +0.35	0.38 +0.38 +0.35	0.038 +0.038 +0.038	1000 +1000 +940	3	0 7	fruit fruit	0.23 0.10

Table 34. Cyprodinil residues in tomatoes resulting from supervised trials in Greece, Italy, Spain, Switzerland and the UK.

TOMATOES Location, year (variety), report No.)	Application					PHI days	Commodity	Residues, mg/kg [1/]
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Greece, 1995, (Alpado), greenhouse 2023/95	WG included fludioxonil	0.38		1000	2 3	14 0 3 7 14	fruit	0.14 0.41 0.34 0.31 0.23
Greece, 1996, (Optima), glasshouse 2100/96	WG included fludioxonil	0.38	0.019	2000	2 3	14 0 3 7 14	fruit	0.08 0.19 0.20 0.13 0.08
Italy, 1995, (114), covered crop, tunnel 2090/95	WG included fludioxonil	0.38		1000	3	0 7 14 21 0 7 14 21	fruit	0.25 0.12 0.03 0.02 m <0.02 m <0.02 m <0.02 m <0.02

TOMATOES Location, year (variety), report No.)	Application					PHI	Commodity	Residues, mg/kg [1/]
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.	days		
Italy, 1995, (Gincala), covered crop (tunnel) 2092/95	WG included fludioxonil	0.38		1200	3	0 7 10 14 21 28 0 7 10 14 21 28	fruit	0.22 0.14 0.16 0.15 0.16 0.06 m <0.02 m 0.02 m <0.02 m 0.02 m <0.02 m <0.02
Italy, 1995, (Max), covered crop, tunnel 2091/95	WG included fludioxonil	0.38		1000 +1250 1500	3	0 7 14 21 0 7 14 21	fruit	0.03 0.08 0.02 <0.02 m <0.02 m <0.02 m <0.02 m <0.02
Spain, 1994, (Daniela), covered crop 2171/93-94	WG included fludioxonil	0.38	0.025	1500	3	0 3 7 14 0 3 7 14	fruit	0.22 0.13 0.10 0.07 m 0.02 m <0.02 m <0.02 m <0.02
Spain, 1994, (Daniela), covered crop 2172/93-94	WG included fludioxonil	0.38	0.034	1100	3	0 3 7 14 0 3 7 14	fruit	0.10 0.11 0.13 0.06 m <0.02 m <0.02 m <0.02 m <0.02
Spain, 1995, (Daniela), covered crop 2172/93-94	WG included fludioxonil	0.38	0.034	1100	3	0 3 7 14 0 3 7 14	fruit	0.25 0.18 0.17 0.17 m <0.02 m <0.02 m <0.02 m <0.02
Spain, 1995, (Santos), covered crop 2171/93-94	WG included fludioxonil	0.38	0.025	1500	3	0 3 7 14 0 3 7 14	fruit	0.18 0.22 0.12 0.07 m <0.02 m <0.02 m <0.02 m <0.02
Switzerland, 1994 (Merano), plastic tunnel 2061/94	WG included fludioxonil	0.38	0.019	2000	3	0 3 7 14 0 3 7 14	fruit	0.21 0.16 0.06 0.05 m <0.02 m <0.02 m <0.02 m <0.02

TOMATOES Location, year (variety), report No.)	Application					PHI days	Commodity	Residues, mg/kg [1/]
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Switzerland, 1994 (Savor), glasshouse 2060/94	WG included fludioxonil	0.38	0.019	2000	3	0 7 14 21 0 7 14 21	fruit	0.21 0.16 0.21 0.14 m <0.02 m <0.02 m 0.02 m 0.02
Switzerland, 1997, (Cannelli), glasshouse 2265/97	WG included fludioxonil	0.38	0.019	2000	2 3	10 0 3 7 14 0 14	fruit	0.08 0.23 0.25 0.09 0.20 c 0.02 c 0.03
Switzerland, 1997, (Selhardy) 2264/97	WG included fludioxonil	0.38	0.019	2000	2 3	10 0 3 7 14	fruit	0.06 0.36 0.12 0.15 0.03
Switzerland, 1999, (Petula) 2126/99	WG included fludioxonil	0.38	0.025	1500	3	7	fruit	0.11 [2/]
UK, 1997, (Durinda), glasshouse 2450/97	WG included fludioxonil	0.37	0.030 to 0.034	1100 to 1250	2 3	10 0 3 7 14	fruit	0.07 0.23 0.17 0.11 0.16
UK, 1997, (Durinda), glasshouse 2451/97	WG included fludioxonil	0.38	0.030 to 0.034	1100 to 1250	2 3	10 0 3 7 14	fruit	0.05 0.09 0.12 0.08 0.11

[1/] m: metabolite CGA 232449 (without m: cyprodinil).
[2/] Study 2126/99: residues in duplicate field samples, 0.10 and 0.11 mg/kg; sample taken prior to processing, 0.11 mg/kg.
c: sample from control plot.

Table 35. Cyprodinil residues in sweet peppers resulting from supervised trials in Italy and Spain.

SWEET PEPPERS Location, year (variety), report No.	Application					PHI days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Italy, 1996 (Phatos) 2060/96	WG included fludioxonil	0.38	0.038	1000	2 3	11 0 7 14 14	fruit	<0.02 0.02 0.02 <0.02 c 0.02
Spain, 1996 (Estar), greenhouse 2001/96	WG included fludioxonil	0.38		1000-1250	2 3	14 0 3 7 14	fruit	0.24 1.2 0.78 0.29 0.10
Spain, 1996 (Saxo), greenhouse 2006/96	WG included fludioxonil	0.38		1000	2 3	11 0 3 7 14	fruit	0.04 0.26 0.22 0.12 0.04
Spain, 1996 (Tanger), greenhouse 2002/96	WG included fludioxonil	0.38		1130-1250	3	7	fruit	0.28

SWEET PEPPERS Location, year (variety), report No.	Application					PHI days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Spain, 1997 (Estar), protective covering 2057/97	WG included fludioxonil	0.38	0.053	710	2 3	11 0 3 7 14	fruit	<0.02 0.41 0.33 0.05 0.03
Spain, 1997 (Italico) 2370/97	WG included fludioxonil	0.37 +0.39 +0.37	0.036 +0.034 +0.024	1020 +1150 +1570	2 3	11 0 3 7 14	fruit	0.02 0.27 0.23 0.09 0.02
Spain, 1997 (Italico), protective covering 2058/97	WG included fludioxonil	0.37 +0.39 +0.39	0.038 +0.028 +0.025	980 +1370 +1560	2 3	14 0 3 7 14 3	fruit	<0.02 0.73 0.32 0.11 0.02 c 0.03
Spain, 1997 (Italico), protective covering 2059/97	WG included fludioxonil	0.39	0.027	1450	2 3	10 0 3 7 14	fruit	0.09 1.0 0.39 0.19 0.03

c: sample from control plot.

Table 36. Cyprodinil residues in lettuce resulting from supervised trials in France, Germany, Italy, Spain and Switzerland.

LETTUCE Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1996 (Batavia Carmen) OF96103 trial AC14	WG included fludioxonil	0.26	0.066	400	3	14	heads	0.02
France, 1996 (Batavia Rosia) OF96103 trial FP04	WG included fludioxonil	0.26	0.066	400	3	14	heads	0.05
France, 1996 (Marianna) OF96103 trial SJ15	WG included fludioxonil	0.26	0.066	400	3	12	heads	0.065
France, 1996 (Newton) OF96104 trial KJ85	WG included fludioxonil	0.26	0.066	400	2 3	10 0 7 14 21	heads heads heads heads heads	0.45 13.1 2.1 0.67 0.19
France, 1997 (Angie), greenhouse 9810201	WG included fludioxonil	0.23	0.056	400	2 3	11 0 7 14 21	heads heads heads heads heads	5.5 15 7.9 4.1 3.4
France, 1997 (Audran) 9713001	WG included fludioxonil	0.26	0.070	380	2 3	10 0 8 15 22	heads heads heads heads heads	0.24 15 0.30 <0.02 <0.02
France, 1997 (Aurica) 9713101	WG included fludioxonil	0.26	0.066	400	3	14	heads	<0.02
France, 1997 (Floreal) 9713102	WG included fludioxonil	0.26	0.066	400	3	14	heads	0.095
France, 1997 (Nalys) greenhouse 9810203	WG included fludioxonil	0.23	0.056	400	3 4	11 0 7 14 21	heads heads heads heads heads	1.6 16 (c 0.02) 9.8 2.8 2.8
France, 1997 (Newton) 9713002	WG included fludioxonil	0.26	0.066	400	2 3	10 0 7 15	heads heads heads heads	0.12 6.1 0.74 0.26

LETTUCE Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1997 (Samourai), greenhouse 9810205	WG included fludioxonil	0.23	0.056	400	3	14	heads	2.7 (c 0.02)
France, 1997 (Sensai), greenhouse 9810202	WG included fludioxonil	0.23	0.056	400	3	14	heads	6.4
France, 1998 (Cybelle) greenhouse 9810206	WG included fludioxonil	0.23	0.056	400	3	14	plants	1.1 (c 0.02)
France, 1998 (Mexico) greenhouse 9810204	WG included fludioxonil	0.23	0.056	400	3	14	plants	2.8 (c 0.03)
France, 1999 (Angie), greenhouse 2168/99	WG included fludioxonil	0.23	0.056	400	3	14	heads	2.9
Germany, 1998 (Nadine) gr 95898	WG included fludioxonil	0.30		600	2	0 7 10 14 21	whole plant whole plant whole plant heads heads	9.2 0.45 0.21 0.08 <0.02
Germany, 1998 (Rapsodi), greenhouse gr 96898	WG included fludioxonil	0.30		600	2	0 7 10 14 21	whole plant whole plant whole plant heads heads	36 (c 0.03) 0.43 0.19 0.11 <0.02
Italy, 1996 (Justine) 2062/96	WG included fludioxonil	0.26		600	3	14	heads	0.18
Italy, 1996 (Lido) 2061/96	WG included fludioxonil	0.26		600	2 3	10 0 7 14 21	heads heads heads heads heads	0.44 9.0 0.73 0.06 0.03
Italy, 2001 (Manita RZ) greenhouse 2044/01	WG included fludioxonil	0.26	0.026	1000	3	0 3 7 14	heads heads heads heads	8.4 6.9 3.0 2.0
Italy, 2001 (Manita), greenhouse 2043/01	WG included fludioxonil	0.26	0.026	1000	3	0 3 7 14	heads heads heads heads	9.9 10.4 4.9 2.2
Italy, 2001 (Mindoro), greenhouse 2042/01	WG included fludioxonil	0.26	0.026	1000	3	0 7 14	heads heads heads	5.6 1.9 1.3
Spain, 1996 (Cos lettuce, Romana) 2003/96	WG included fludioxonil	0.26	0.038	700	2 3	10 0 3 7 14	heads heads heads heads heads	1.4 4.9 3.3 2.3 1.1
Spain, 1996 (Cos lettuce, Valladolid) 2004/96	WG included fludioxonil	0.26	0.038	700	3	14	heads	1.0
Spain, 1997 (Cos lettuce, Iceberg 2056/97	WG included fludioxonil	0.26	0.053	500	2 3	10 0 7 14 21	whole plant whole plant whole plant whole plant whole plant	0.09 3.3 0.03 <0.02 <0.02
Switzerland, 1996 (Larand SM) 2094/96	WG included fludioxonil	0.30	0.060	500	1 2	7 0 7 11 14 21	heads heads heads heads heads heads	1.3 9.9 0.37 0.05 <0.02 <0.02

LETTUCE Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Switzerland, 1996 (Pontiac) 2095/96	WG included fludioxonil	0.30	0.060	500	1 2	7 0 7 10 14 21	heads heads heads heads heads heads	<0.02 7.0 (c 0.54) 0.42 0.23 0.02 <0.02
Switzerland, 1997 (Larand) 2266/97	WG included fludioxonil	0.30	0.060	500	2 3	11 0 7 14 21 28	heads heads heads heads heads heads	0.12 5.0 0.19 0.04 <0.02 <0.02
Switzerland, 1997 (Newton) 2268/97	WG included fludioxonil	0.30	0.060	500	2 3	10 0 7 14 21 28	heads heads heads heads heads heads	0.12 9.2 0.30 0.02 <0.02 <0.02
Switzerland, 1997 (Stephanie) 2267/97	WG included fludioxonil	0.30	0.060	500	2 3	10 0 7 14 21 28	heads heads heads heads heads heads	0.21 2.5 0.22 0.02 <0.02 <0.02

c: sample from control plot.

Table 37. Cyprodinil residues in beans resulting from supervised trials in France, Spain and Switzerland.

BEANS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1996 (Adagio) French beans. OF96108 trial LD63	WG included fludioxonil	0.38	0.094	400	3	14	pods	0.07
France, 1996 (Calypso) French beans OF96109 trial KJ56	WG included fludioxonil	0.38	0.094	400	2 3	10 0 7 14 21	pods pods pods pods pods	0.06 0.89 0.15 0.10 0.05
France, 1996 (Cupidon) French beans. OF96108 trial FP15	WG included fludioxonil	0.38	0.094	400	3	14	pods	0.14
France, 1996 (Xavo) French beans OF96108 trial SJ29	WG included fludioxonil	0.38	0.094	400	3	13	pods	0.10
France, 1998 (Ardinal) French beans. 9812803	WG included fludioxonil	0.38	0.094	400	2	14	pods	0.14
France, 1998 (Booster) French beans. 9812801	WG included fludioxonil	0.37	0.094	400	2	14	pods	0.18
France, 1998 (Capitole) French beans 9812701	WG included fludioxonil	0.36	0.094	380	2	0 3 7 14 21	pods pods pods pods pods	1.2 1.3 0.66 0.15 0.04
France, 1998 (Crugaly) French beans 9812703	WG included fludioxonil	0.37	0.094	390	2	0 3 7 14 21	pods pods pods pods pods	0.81 0.66 0.47 0.11 0.06
France, 1998 (Longio) French beans 9812702	WG included fludioxonil	0.34	0.094	370	2	0 3 7 14 21	pods pods pods pods pods	0.64 0.50 0.16 0.11 0.07

BEANS Location, year (variety), report No.	Application Form	kg ai/ha	kg ai/hl	water, l/ha	no.	PHI, days	Commodity	Residues, mg/kg
France, 1998 (Longio) French beans. 9812804	WG included fludioxonil	0.40	0.094	430	2	14	pods	0.19
France, 1998 (Longio) French beans. 9812802	WG included fludioxonil	0.38	0.094	410	2	14	pods	0.29
France, 1998 (Xéra) French beans 9812704	WG included fludioxonil	0.39	0.094	420	2	0 3 7 14 21	pods pods pods pods pods	0.79 0.97 0.49 0.13 0.05
France, 2000 (Flavert) kidney beans. 0011201	WG included fludioxonil	0.38	0.094	400	2	14	seeds pods	0.52 0.26
France, 2000 (Astoria) kidney beans. 0011202	WG included fludioxonil	0.38	0.094	400	2	14	seeds pods	0.11 0.20
Spain, 1996 (Buenos Aires) common beans 2009/96	WG included fludioxonil	0.38		2000	2 3	10 0 7 14 21	pods pods pods pods pods	0.07 0.88 0.17 0.03 0.02
Spain, 1996 (Maite) common beans, greenhouse 2010/96	WG included fludioxonil	0.38		1250 +1500 +1500	2 3	10 0 7 14 21	pods pods pods pods pods	0.18 0.82 0.20 0.04 <0.02
Spain, 1997 (Emerite) French beans, greenhouse 157/97, 2374/97	WG included fludioxonil	0.37 +0.39 +0.39	0.036 +0.037 +0.037	1040 +1040 +1060	2 3	13 0 7 14 21	pods pods pods pods pods	0.07 0.40 0.22 0.09 0.06
Spain, 1997 (Encañe Dulce) French beans, greenhouse 157/97, 2373/97	WG included fludioxonil	0.33 +0.37 +0.34	0.038 +0.051 +0.054	880 +720 +640	2 3	10 0 7 14 21	pods pods pods pods pods	0.08 0.55 0.12 0.02 <0.02
Spain, 1997 (Helda) common beans, greenhouse 2002/97	WG included fludioxonil	0.38	0.038	1000	2 3	10 0 7 14 21 7	pods pods pods pods pods pods	0.20 1.1 0.36 0.12 0.03 c 0.03
Spain, 1997 (Maite) common beans, greenhouse 2001/97	WG included fludioxonil	0.38	0.039 +0.035 +0.035	950 +1060 +1060	2 3	14 0 7 14 21	pods pods pods pods pods	0.18 1.3 0.40 0.11 0.05
Spain, 1997 (Musica) French beans greenhouse 157/97, 2371/97	WG included fludioxonil	0.38 +0.36 +0.39	0.033 +0.025 +0.030	1150 +1440 +1330	2 3	14 0 7 14 21	pods pods pods pods pods	0.04 0.69 0.22 0.09 0.03
Spain, 1997 (Musica) French beans greenhouse 157/97, 2372/97	WG included fludioxonil	0.38 +0.37 +0.35	0.032 +0.032 +0.037	1210 +1160 +940	2 3	13 0 7 14 21	pods pods pods pods pods	0.12 0.88 0.34 0.12 0.08
Switzerland, 1998 (Processor) common beans. 2107/98	WG included fludioxonil	0.38	0.047	800	2	14	pods	0.085
Switzerland, 1998 (Sonate) common beans. 2109/98	WG included fludioxonil	0.38	0.047	800	2	14	pods	0.17

c: sample from control plot.

Table 38. Cyprodinil residues in peas resulting from supervised trials in France and Switzerland.

PEAS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1995 (Baccara) OF95121/KJ36	WG included difenoconazole	0.40	0.1	400	1 2	21 0 7 14 21 28	whole pod whole pod whole pod whole pod whole pod peas (seed)	<0.02 0.76 0.14 0.08 0.09 0.15
France, 1995 (Brevent) OF95120/BY91	WG included difenoconazole	0.40	0.1	400	2	28	peas (seed)	<0.02
France, 1995 (Messire) OF95120/TP05	WG included difenoconazole	0.40	0.1	400	2	30	peas (seed)	0.02
France, 1995 (Messire) OF95121/AC76	WG included difenoconazole	0.40	0.1	400	1 2	21 0 7 14 21 28	whole pod whole pod whole pod whole pod whole pod peas (seed)	<0.02 1.1 0.18 0.07 0.05 0.11
France, 1995 (Messire) OF95121/LD28	WG included difenoconazole	0.40	0.1	400	1 2	20 0 7 14 21 28	whole pod whole pod whole pod whole pod whole pod peas (seed)	<0.02 0.84 0.21 0.07 0.03 0.04
France, 1995 (Solara) OF95120/KJ37	WG included difenoconazole	0.40	0.1	400	2	28	peas (seed)	0.08
France, 1996 (Baccara) OF96110/KJ69	WG included difenoconazole	0.40	0.1	400	2	21	peas (seed)	0.06
France, 1996 (Brevent) OF96110/BY13	WG included difenoconazole	0.40	0.1	400	2	28	peas (seed)	0.08
France, 1996 (Bridge) OF96110/DE04	WG included difenoconazole	0.40	0.1	400	2	28	peas (seeds)	<0.02
France, 1996 (Caprice) OF96107 Trial AC31	WG included fludioxonil	0.38	0.094	400	3	13	grains	0.02
France, 1996 (Caprice) OF96107 Trial LD64	WG included fludioxonil	0.38	0.094	400	3	14	grains	0.02
France, 1996 (Fonado) OF96105 Trial DE18	WG included fludioxonil	0.38	0.094	400	3	14	grains [2/]	0.04
France, 1996 (Fonado) OF96106 Trial DE19	WG included fludioxonil	0.38	0.094	400	3	14	grains [2/]	<0.02
France, 1996 (Kazar) OF96110/AC30	WG included difenoconazole	0.40	0.1	400	2	28	peas (seeds)	0.22
France, 1996 (Messire) OF96110/LD65	WG included difenoconazole	0.40	0.1	400	2	28	peas (seed)	0.04
France, 1996 (Solara) OF96110/SJ28	WG included difenoconazole	0.40	0.1	400	2	28	peas (seeds)	0.04
France, 1998 (Cador) 9811501	WG included fludioxonil	0.38	0.094	400	2	0 7 14 20	fresh seeds	0.05 <0.02 <0.02 <0.02
France, 1998 (Etna) 9811602	WG included fludioxonil	0.38	0.094	400	2	14	fresh seeds	<0.02
France, 1998 (Koka) 9811601	WG included fludioxonil	0.38	0.094	400	2	14	fresh seeds	0.02
France, 1998 (Koka) 9811603	WG included fludioxonil	0.38	0.094	400	2	14	fresh seeds	0.05
France, 1998 (Koka) 9811604	WG included fludioxonil	0.38	0.094	400	2	14	fresh seeds	0.025
France, 1998 (Piano) 9811605	WG included fludioxonil	0.38	0.094	400	2	14	fresh seeds	0.025

PEAS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 2001 (Bonette) 0112202	WG included fludioxonil	0.38	0.094	400	2	14	empty pods seeds whole pods [1/]	0.13 0.03 0.06
France, 2001 (Frediro) 0112201	WG included fludioxonil	0.38	0.075	500	2	14	empty pods seeds whole pods [1/]	0.11 0.05 0.06
Switzerland, 1995 (Baccara) 2055/95	WG included fludioxonil	0.40		500	2	28	peas (seed)	0.09
Switzerland, 1995 (Baccara) 2056/95	WG included fludioxonil	0.40		500	1 2	28 0 4 7 14 28	pods + seeds pods + seeds pods + seeds pods + seeds pods + seeds seeds	<0.05 0.75 0.26 0.12 0.07 0.09
Switzerland, 1998 (Bördi) 2115/98	WG included fludioxonil	0.38	0.047	800	2	14	peas (seeds) empty pods	<0.02 0.04
Switzerland, 1998 (Merveille Hative). 2108/98	WG included fludioxonil	0.38	0.047	800	2	14	peas (seeds) empty pods	<0.02 0.05

[1/] Whole pods: residue calculated from residues in seeds and empty pods.
[2/] Two related trials, one harvested manually, one mechanically.

Table 39. Cyprodinil residues in barley resulting from supervised trials in France, Germany and Switzerland.

BARLEY Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1993 (Alpha) OF93109 trial AC95	WG	0.50		400	2	42	grain	0.74
France, 1993 (Alpha) winter barley OF93115 Trial AC 96	WG included propiconazole	0.48		400	2	42	grain	0.32
France, 1993 (Barberousse) OF93109 trial RA95	WG	0.50		400	2	48	grain	1.3
France, 1993 (Barberousse) winter barley. OF93115 Trial RA 96	WG included propiconazole	0.48		400	2	48	grain	0.77
France, 1993 (Clarine) OF93109 trial GD95	WG	0.50		400	2	42	grain	0.54
France, 1993 (Clarine) winter barley OF93115 Trial GD 96	WG included propiconazole	0.48		400	2	42	grain	0.48
France, 1993 (Plaisant) OF93109 trial LA96	WG	0.50		400	2	42	grain	0.76 c 0.03
France, 1993 (Plaisant) winter barley OF93115 Trial LA 97	WG included propiconazole	0.48		400	2	63	grain	1.6
France, 1994 (Baraka) OF94123 trial BY06	WG included fenpropidin	0.38		390	2	46	grain	1.2
France, 1994 (Express) OF94123 trial LD91	WG included fenpropidin	0.38		390	2	41	grain	1.4
France, 1994 (Express) winter barley OF94105 Trial LD97	WG included propiconazole	0.48		400	2	41	grain	2.0
France, 1994 (Plaisant) OF94123 trial LA06	WG included fenpropidin	0.38		400	2	40	grain	0.55
France, 1994 (Plaisant) OF94123 trial RA95	WG included fenpropidin	0.38		400	2	45	grain	0.31
France, 1994 (Plaisant) winter barley OF94105 Trial RA97	WG included propiconazole	0.48		400	2	46	grain	0.36
France, 1995 (Alexis), spring barley OF95151 Trial KJ30	WG	0.60	0.15	400	1	63	grain malt wort	<0.02 <0.02 <0.01

BARLEY Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1995 (Alexis), spring barley OF95151 Trial KJ30	WG	0.60	0.15	400	1	45	grain malt wort	0.07 0.07 <0.01
France, 1995 (Alexis), spring barley OF95151 Trial KJ30	WG	0.60	0.15	400	2	45	grain malt wort	0.13 0.11 <0.01
France, 1995 (Energy) OF95108 trial KJ28	WG included fenpropidin	0.38		400	2	48	grain	0.14
France, 1995 (Express) OF95108 trial LD21	WG included fenpropidin	0.38		400	2	41	grain	0.93
France, 1995 (Plaisant) OF95108 trial DE95	WG included fenpropidin	0.38		430	2	46	grain	0.22
France, 1995 (Plaisant), winter barley OF95151 Trial DE93	WG	0.60	0.14	430	1	80	grain malt wort	<0.02 <0.02 <0.01
France, 1995 (Plaisant), winter barley OF95151 Trial DE93	WG	0.60	0.14	430	1	46	grain malt wort	0.58 0.63 <0.01
France, 1995 (Plaisant), winter barley OF95151 Trial DE93	WG	0.60	0.14	430	2	46	grain malt wort	0.75 0.73 <0.01
France, 1996 (Plaisant) OF96142 trial DE11	EC included cyproconazole	0.48		420	1 1 1 1 1 1 2 2 2	81 81 81 49 49 49 49 49 49	grain malt wort grain malt wort grain malt wort	<0.02 0.02 <0.02 0.40 0.45 <0.02 0.40 0.54 <0.02
France, 1997 (Alexis) spring barley 9715401	WG	0.60		400	2	52	grain malt wort Tepral wort fermented beer	0.06 0.10 <0.02 <0.02 <0.01
France, 1997 (Alexis), spring barley 9715801	EC included fenpropidin	0.38	0.093	400	2	52	grain malt wort Tepral wort fermented beer	0.10 0.14 <0.02 <0.02 <0.01
France, 1997 (Alpha) winter barley 2189/97	WG included cyproconazole	0.60	0.15	400	2	42	grain	1.5
France, 1997 (Baraka) winter barley 2187/97	WG included cyproconazole	0.60	0.15	400	2	45	grain	1.2
France, 1997 (Baraka) winter barley 2188/97	WG included cyproconazole	0.60	0.18	330	2	43	grain	<0.02
France, 1997 (Esterel) winter barley 2180/97	WG included cyproconazole	0.60	0.15	400	2	46	grain	0.44
France, 1997 (Kelibia) winter barley 2178/97	WG included cyproconazole	0.60	0.15	400	2	40	grain	0.58
France, 1997 (Kelibia) winter barley 2179/97	WG included cyproconazole	0.60	0.15	400	2	44	grain	1.1
France, 1997 (Majestic) winter barley 2181/97	WG included cyproconazole	0.60	0.15	400	2	46	grain	0.65

BARLEY Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1997 (Plaisant) 9715702	EC included fenpropidin	0.37-0.38		410	2	58	grain malt wort Tepral wort fermented beer	0.18 0.24 <0.02 <0.02 <0.01
France, 1997 (Plaisant), winter barley 9715701	EC included fenpropidin	0.36		390	2	45	grain malt wort Tepral wort fermented beer	0.36 0.42 <0.02 <0.02 <0.01
France, 1997 (Prisma) spring barley 9715002	EC included propiconazole	0.58	0.15	400	2	52	grain malt wort Tepral wort fermented beer	0.19 0.29 <0.02 <0.02 <0.01
France, 1997 (Prisma) spring barley 9715402	WG	0.60		400	2	52	grain malt wort Tepral wort fermented beer	0.39 0.41 <0.02 <0.02 <0.01
France, 1997 (Prisma), spring barley 9715802	EC included fenpropidin	0.38	0.093	405	2	45	grain malt wort Tepral wort fermented beer	0.25 0.38 <0.02 <0.02 <0.01
France, 1997 (Sonja) winter barley 2186/97	WG included cyproconazole	0.60	0.15	400	2	43	grain	0.24
France, 1998 (Alexis) spring barley 9810401	WG included cyproconazole	0.59	0.15	390	2	48	grain malt wort beer	0.67 0.94 <0.01 <0.01
France, 1998 (Clarine) winter barley 9813001	WG included cyproconazole	0.60	0.15	400	2	45	grain	1.9
France, 1998 (Plaisant) winter barley 9810301	WG included cyproconazole	0.59	0.15	390	2	59	grain malt wort beer	0.85 0.97 <0.01 <0.01
France, 1998 (Plaisant) winter barley 9810302	WG included cyproconazole	0.60	0.15	400	2	43	grain malt wort beer	0.74 0.82 <0.01 <0.01
France, 1998 (Primadur) winter barley 9813002	WG included cyproconazole	0.61	0.15	400	2	45	grain	1.8
France, 1998 (Prisma) spring barley 9810402	WG included cyproconazole	0.59	0.15	390	2	45	grain malt wort beer	0.28 0.47 <0.01 <0.01
France, 1999 (Cork) spring barley 2025/99	WG	0.60	0.15	400	2	52	grain malt wort Tepral wort fermented wort, brewing beer	0.14 0.17 <0.002 <0.02 <0.02 <0.002

BARLEY Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1999 (Esterel) winter barley 2024/99	WG	0.58	0.15	390	2	46	grain	1.3
France, 1999 (Esterel) winter barley 2023/99	WG	0.61	0.15	410	2	53	grain malt wort Tepral wort fermented wort, brewing beer	1.1 1.2 0.003 <0.02 <0.02 <0.002
France, 1999 (Prisma) spring barley 2026/99	WG	0.54	0.15	360	2	45	grain malt wort Tepral wort fermented wort, brewing beer	0.11 0.10 <0.002 <0.02 <0.02 <0.002
Germany, 1998 (Alexis) spring barley gr 41198	WG	0.75		400	2	22 42 49 55 49 49	ears ears grain grain pearl barley pearl dust	0.12 0.02 0.03 0.10 0.03 0.08
Germany, 1998 (Barke) spring barley gr 42298	WG	0.75		400	2	22 41 49 55 55 55 55 55 55 55	ears ears grain grain pearl barley pearling dust malt malt germ spent grain beer	0.05 0.03 0.03 0.03 0.02 0.07 0.03 0.02 0.04 <0.005
Germany, 1998 (Jasmin) winter barley gr 37498	WG included cyproconazole	0.60		400	2	20 42 48 55	ears ears grain grain	0.12 0.09 0.09 0.08
Germany, 1998 (Krona) spring barley gr 43498	WG	0.75		400	2	21 41 49 56 49 49 49 49 49 49	ears ears grain grain pearl barley pearling dust malt malt germ spent grain beer	0.11 0.20 0.17 0.21 0.07 0.20 0.16 0.06 0.15 <0.005
Germany, 1998 (Scarlett) spring barley gr 38598	WG included cyproconazole	0.60		400	2	21 43 53 57	ears ears grain grain	0.24 0.26 0.17 0.20

BARLEY Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1998 (Scarlett) spring barley gr 44598	WG	0.75		400	2	21 43 53 57 53 53 53 53 53	ears ears grain grain pearl barley pearling dust malt malt germ spent grain beer	0.30 0.44 0.34 0.37 0.12 0.52 0.30 0.08 0.31 <0.005
Germany, 1998 (Theresa) winter barley gr 35198	WG included cyproconazole	0.60		400	2	21 42 50 56	ears ears grain grain	0.29 0.11 0.17 0.18
Germany, 1998 (Theresa) winter barley gr 36298	WG included cyproconazole	0.60		400	2	20 43 48 55	ears ears grain grain	0.56 0.57 0.73 0.58
Switzerland, 1993 (Rebelle) 2015/93	WG included propiconazole	0.40	0.080	500	2	57	grain	0.12

c: sample from control plot.

Table 40. Cyprodinil residues in rye resulting from supervised trials in Germany.

WINTER RYE Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1995 (Amundo) gr 12595	EC included propiconazole	0.50		400	2	20 41 48 55	ear ear grain grain	0.53 0.16 0.07 0.06
Germany, 1996 (Rapid) IF-96/07966-00	EC included propiconazole	0.50		300	2	22 42 50 57	ear ear grain grain	0.78 0.38 0.08 0.10
Germany, 1998 (Borellus) gr 40498	WG included cyproconazole	0.60		400	2	21 41 49 56	ear ear grain grain	0.61 0.29 0.08 0.07
Germany, 1998 (Hacada) gr 39298	WG included cyproconazole	0.60		400	2	21 41 49 57	ear ear grain grain	0.68 0.22 0.06 0.07
Germany, 1993 (Luchs) gr 30493	WG	0.75		400	1	34 41	ears ears grain	0.02 <0.02 <0.02
Germany, 1994 (Danko) gr 41994	WG	0.75		400	1	34 41 80	ears ears grain	1.7 3.9 0.04

Table 41. Cyprodinil residues in wheat resulting from supervised trials in Denmark, France, Germany, South Africa, Switzerland and the UK.

WINTER WHEAT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Denmark, 1994 (Marabu) 2083/94	WG included CGA 245704	0.50	0.20	250	1	42 63 81	ears ears grain	<0.02 <0.02 <0.02

WINTER WHEAT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Denmark, 1994 (Pepital) 2084/94	WG included CGA 245704	0.50	0.20	250	1	42 63 71	ears ears grain	<0.02 <0.02 <0.02
France, 1992 (Epiroux) OF92003 trial 133	WG	0.75		400	2	69	grain	0.07
France, 1992 (Rossini) OF92003 trial U54	WG	0.75		400	2	48	grain	0.07
France, 1992 (Rossini) OF92003 trial Y53	WG	0.75		400	2	58	grain	0.08
France, 1992 (Soisson) OF92003 trial N95	WG	0.75		400	2	66	grain	0.01
France, 1993 (Recital) OF93111 trial DE93	WG included propiconazole	0.60		400	3	61	grain	0.11
France, 1993 (Soisson) OF93111 trial GD91	WG included propiconazole	0.60		400	3	69	grain	<0.02
France, 1993 (Soisson) OF93111 trial LD94	WG included propiconazole	0.60		400	3	77	grain	<0.02
France, 1994 (Florence Aurore) OF94122 trial BY05	WG included fenpropidin	0.38		390	2	42	grain	<0.02
France, 1994 (Recital) OF94122 trial SJ92	WG included fenpropidin	0.38		400	2	38	grain	<0.02
France, 1994 (Rossini) OF94122 trial GD95	WG included fenpropidin	0.38		390	2	41	grain	<0.02
France, 1994 (Sederer) OF94104 trial DE05	EC included propiconazole	0.60		400	2	43	grain	0.13
France, 1994 (Soisson) OF94104 trial LD95	EC included propiconazole	0.60		400	2	42	grain	0.16
France, 1994 (Soissons) OF94122 trial LD92	WG included fenpropidin	0.38		390	2	42	grain	<0.02
France, 1995 (Récital) OF95107 trial SJ85	WG included fenpropidin	0.38		400	2	41	grain	0.21
France, 1995 (Scipion) OF95107 trial KJ27	WG included fenpropidin	0.38		400	2	41	grain	0.05
France, 1995 (Tremi) OF95107 trial LD20	WG included fenpropidin	0.38		400	2	42	grain	0.08
France, 1997 (Ami) 2208/97	WG included cyproconazole	0.60		400	2	42	grain	0.10
France, 1997 (Aztec) 2211/97	WG included cyproconazole	0.60		400	2	46	grain	0.06
France, 1997 (Eureka) 2219/97	WG included cyproconazole	0.60		400	2	43	grain	0.13
France, 1997 (Hugo) 2217/97	WG included cyproconazole	0.60		400	2	45	grain	0.11
France, 1997 (Sideral) 2210/97	WG included cyproconazole	0.60		400	2	44	grain	0.05
France, 1997 (Soissons) 2209/97	WG included cyproconazole	0.60		400	2	46	grain	0.07
France, 1997 (Tremie) 2218/97	WG included cyproconazole	0.60		330	2	42	grain	0.10
France, 1997 (Victo) 2216/97	WG included cyproconazole	0.60		400	2	45	grain	0.32
France, 1998 (Arstar) 9812901	WG included cyproconazole	0.60	0.15	410 +420	2	47	grain	0.13
France, 1998 (Primadur) 9812902	WG included cyproconazole	0.60	0.15	400	2	45	grain	0.08
Germany, 1995 (Appollo) 2151/95 gr 62695	EC included propiconazole	0.5		400	2	21 27 36 49	ears ears grain grain	1.1 0.65 0.11 0.06

WINTER WHEAT Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1995 (Astron) gr 32895 2172/95	WG included CGA 245704	0.5		400	1	48 88	ears grain	<0.10 <0.02
Germany, 1995 (Zentos) 2150/95 gr 12695	EC included propiconazole	0.5		400	2	21 28 35 49	ears ears grain grain	0.15 0.15 0.04 <0.02
Germany, 1995 (Zentos) gr 12895 2171/95	WG included CGA 245704	0.5		400	1	104	grain	<0.02
Germany, 1996 (Contra) IF-96/07964-00	EC included propiconazole	0.50		300	2	49 55	grain	0.03 0.03
Germany, 1996 (Ritmo) IF-96/07965-00	EC included propiconazole	0.50		300	2	49 55	grain grain	0.07 0.07
Germany, 1997 (Ritmo) IF-97/09996-00	WG	0.72 +0.78		290 +310	2	22 43 48 55	ears ears grain grain	0.29 <0.02 <0.02 <0.02
Germany, 1997 (Ritmo) IF-97/09998-00	WG	0.73 +0.77		290 +310	2	21 42 50 56	ears ears grain grain	0.21 0.09 0.06 0.05
Germany, 1998 (Alidos) gr 34598	WG included cyproconazole	0.60		400	2	20 42 48 54	ears ears grain grain	1.3 0.64 0.14 0.09
South Africa, 1991 (Palmiet) 2092/91	WG	0.75	0.17	440	1	28 35 42 93 28	ears ears ears grain ears	0.03 <0.02 <0.02 <0.02 c 0.03
Switzerland, 1990 (Arina) 2020/90	WP	0.50		500	2	45	grain	0.052
Switzerland, 1993 (Arina) 2019/93	WG included propiconazole	0.60	0.12	500	2	56	grain	0.02
Switzerland, 2000 (Arina) 2013/00	WG	0.75 +1.0	0.015 +0.020	500	2	36	grain	0.19
UK, 1991 (Apollo) CSTR/029:1	WG	0.75		200	2	31 59	grain	0.04 0.03
UK, 1991 (Mercia) CSTR/029:1	WG	0.75		200	2	54 63	grain	0.04 0.04
UK, 1991 (Riband) CSTR/029:1	WG	0.75		200	2	49 55	grain	0.06 0.02
UK, 1995 (Apollo) FR0195AR [1/]	WG	0.51		200	2	50	grain	0.21
UK, 1995 (Apollo) FR0195AR [1/]	EC included propiconazole	0.51		200	2	50	grain	0.21
UK, 1997 (Hunter) FR1397	WG	0.75 +0.50	0.037 +0.025	200	2	58	grain	0.03
UK, 1997 (Hussar) FR1497	WG	0.75 +0.50	0.037 +0.025	200	2	54	grain	0.02

[1/] FR0195AR: no field reports, not credible, study cannot be evaluated.
c: sample from control plot.

Table 42. Cyprodinil residues in almonds resulting from supervised trials in the USA.

ALMONDS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995, (Carmel) 02-FR-037-95	WP	0.56		2700	3	151	nuts (kernels)	<0.02

ALMONDS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995, (Mission) 0W-FR-520-95	WP	0.56		2700 to 3300	4	150	nuts (kernels)	<0.02
USA (CA), 1995, (Butte) 0W-FR-423-95	WP	0.56		3000 to 3100	4	150	nuts (kernels)	<0.02
USA (CA), 1995, (Mission) 0W-FR-424-95	WP	0.56		2800 to 3000	4	150	nuts (kernels)	<0.02
USA (CA), 1995, (Non-pariel) 0W-FR-422-95	WP	0.56		2700 to 2900	4	150	nuts (kernels)	<0.02

Table 43. Cyprodinil residues in barley straw and fodder resulting from supervised trials in France, Germany and Switzerland.

BARLEY STRAW AND FODDER Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1993 (Alpha) OF93109 trial AC95	WG	0.50		400	2	42	barley straw	0.84 c 0.10
France, 1993 (Alpha) winter barley OF93115 Trial AC 96	WG included propiconazole	0.48		400	2	42	barley straw	0.41
France, 1993 (Barberousse) OF93109 trial RA95	WG	0.50		400	2	48	barley straw	0.51 c 0.09
France, 1993 (Barberousse) winter barley OF93115 Trial RA 96	WG included propiconazole	0.48		400	2	48	barley straw	0.32
France, 1993 (Clarine) OF93109 trial GD95	WG	0.50		400	2	42	barley straw	0.67 c 0.07
France, 1993 (Clarine) winter barley OF93115 Trial GD 96	WG included propiconazole	0.48		400	2	42	barley straw	0.42
France, 1993 (Plaisant) OF93109 trial LA96	WG	0.50		400	2	42	barley straw	0.55 c 0.12
France, 1993 (Plaisant) winter barley OF93115 Trial LA 97	WG included propiconazole	0.48		400	2	63	barley straw	0.81
France, 1994 (Baraka) OF94123 trial BY06	WG included fenpropidin	0.38		390	2	46	barley straw	0.87 c 0.10
France, 1994 (Express) OF94123 trial LD91	WG included fenpropidin	0.38		390	2	41	barley straw	0.24
France, 1994 (Express) winter barley OF94105 Trial LD97	WG included propiconazole	0.48		400	2	41	barley straw	0.39
France, 1994 (Plaisant) OF94123 trial LA06	WG included fenpropidin	0.38		400	2	40	barley straw	0.46
France, 1994 (Plaisant) OF94123 trial RA95	WG included fenpropidin	0.38		400	2	45	barley straw	0.33
France, 1994 (Plaisant) winter barley OF94105 Trial RA97	WG included propiconazole	0.48		400	2	46	barley straw	0.42
France, 1995 (Energy) OF95108 trial KJ28	WG included fenpropidin	0.38		400	2	48	barley straw	0.22
France, 1995 (Express) OF95108 trial LD21	WG included fenpropidin	0.38		400	2	41	barley straw	0.40
France, 1995 (Plaisant) OF95108 trial DE95	WG included fenpropidin	0.38		430	2	46	barley straw	0.18
France, 1997 (Alpha) winter barley 2189/97	WG included cyproconazole	0.60	0.15	400	2	42	barley straw	1.1
France, 1997 (Baraka) winter barley 2187/97	WG included cyproconazole	0.60	0.15	400	2	45	barley straw	0.61
France, 1997 (Baraka) winter barley 2188/97	WG included cyproconazole	0.60	0.18	330	2	43	barley straw	0.45
France, 1997 (Esterel) winter barley 2180/97	WG included cyproconazole	0.60	0.15	400	2	46	barley straw	0.15
France, 1997 (Kelibia) winter barley 2178/97	WG included cyproconazole	0.60	0.15	400	2	40	barley straw	0.82

BARLEY STRAW AND FODDER Location, year (variety), report No.	Application				PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
France, 1997 (Kelibia) winter barley 2179/97	WG included cyproconazole	0.60	0.15	400	2	44	barley straw	0.33
France, 1997 (Majestic) winter barley 2181/97	WG included cyproconazole	0.60	0.15	400	2	46	barley straw	0.34
France, 1997 (Sonja) winter barley 2186/97	WG included cyproconazole	0.60	0.15	400	2	43	barley straw	0.20
France, 1998 (Clarine) winter barley 9813001	WG included cyproconazole	0.60	0.15	400	2	45	barley straw	1.7
France, 1998 (Primadur) winter barley 9813002	WG included cyproconazole	0.61	0.15	400	2	45	barley straw	2.5
Germany, 1998 (Alexis) spring barley gr 41198	WG	0.75		400	2	0 22 42 49 55	whole plant stalks stalks barley straw barley straw	12 0.49 0.07 0.13 0.15
Germany, 1998 (Barke) spring barley gr 42298	WG	0.75		400	2	0 22 41 49 55	whole plant stalks stalks barley straw barley straw	12 0.28 0.13 0.11 0.19
Germany, 1998 (Jasmin) winter barley gr 37498	WG included cyproconazole	0.60		400	2	0 20 42 48 55	whole plant stalks stalks barley straw barley straw	6.4 0.41 0.25 0.11 0.15
Germany, 1998 (Krona) spring barley gr 43498	WG	0.75		400	2	0 21 41 49 56	whole plant stalks stalks barley straw barley straw	13 0.51 0.17 0.11 0.12
Germany, 1998 (Scarlett) spring barley gr 38598	WG included cyproconazole	0.60		400	2	0 21 43 53 57	whole plant stalks stalks barley straw barley straw	10 0.39 0.65 0.34 0.18
Germany, 1998 (Scarlett) spring barley gr 44598	WG	0.75		400	2	0 21 43 53 57	whole plant stalks stalks barley straw barley straw	7.5 0.35 1.2 0.28 0.26
Germany, 1998 (Theresa) winter barley gr 35198	WG included cyproconazole	0.60		400	2	0 21 42 50 56	whole plant stalks stalks barley straw barley straw	7.6 1.3 0.11 0.17 0.12
Germany, 1998 (Theresa) winter barley gr 36298	WG included cyproconazole	0.60		400	2	0 20 43 48 55	whole plant stalks stalks barley straw barley straw	7.8 1.0 0.56 0.23 0.39
Switzerland, 1993 (Rebelle) 2015/93	WG includes propiconazole	0.40	0.080	500	2	57	barley straw	0.21 c 0.05

c: sample from control plot.

Table 44. Cyprodinil residues in rye straw and fodder resulting from supervised trials in Germany.

RYE STRAW AND FODDER Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1993 (Luchs) gr 30493	WG	0.75		400	1	0	whole plant	6.8
						13	whole plant	0.53
						28	whole plant	0.61
						34	stalks	0.74
						41	stalks	0.39
						90	rye straw	0.05
Germany, 1994 (Danko) gr 41994	WG	0.75		400	1	0	whole plant	8.3
						13	whole plant	1.3
						28	whole plant	0.16
						34	stalks	0.43
						41	stalks	0.34
						80	rye straw	0.06
Germany, 1995 (Amundo) gr 12595	EC included propiconazole	0.50		400	2	0	plant	6.6
						20	stalks	0.69
						41	stalks	0.26
						48	rye straw	0.24
						55	rye straw	0.10
Germany, 1996 (Rapid) IF-96/07966-00	EC included propiconazole	0.50		300	2	0	plant	6.3
						22	plant	0.78
						42	plant	0.28
						50	rye straw	0.52
						57	rye straw	0.49
Germany, 1998 (Borellus) gr 40498	WG included cyproconazole	0.60		400	2	0	plant	11.4
						21	stalks	1.3
						41	stalks	0.28
						49	rye straw	0.20
						56	rye straw	0.16
Germany, 1998 (Hacada) gr 39298	WG included cyproconazole	0.60		400	2	0	plant	5.7
						21	stalks	0.87
						41	stalks	0.24
						49	rye straw	0.17
						57	rye straw	0.47

Table 45. Cyprodinil residues in wheat straw and fodder resulting from supervised trials in Denmark, France, Germany, South Africa, Switzerland and the UK.

WHEAT STRAW AND FODDER Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Denmark, 1994 (Marabu) 2083/94	WG included CGA 245704	0.50	0.20	250	1	1	whole plants	5.3
						21	whole plants	0.11
						42	stalks	<0.05
						63	stalks	<0.05
						81	wheat straw	<0.05
Denmark, 1994 (Pepital) 2084/94	WG included CGA 245704	0.50	0.20	250	1	1	whole plants	7.4
						21	whole plants	0.13
						42	stalks	<0.05
						63	stalks	<0.05
						71	wheat straw	<0.05
France, 1992 (Epiroux) OF92003 trial 133	WG	0.75		400	2	69	wheat straw	0.03
France, 1992 (Rossini) OF92003 trial U54	WG	0.75		400	2	48	wheat straw	2.3
France, 1992 (Rossini) OF92003 trial Y53	WG	0.75		400	2	58	wheat straw	0.80
France, 1992 (Soisson) OF92003 trial N95	WG	0.75		400	2	66	wheat straw	0.16

WHEAT STRAW AND FODDER Location, year (variety), report No.	Application Form	kg ai/ha	kg ai/hl	water, l/ha	no.	PHI, days	Commodity	Residues, mg/kg
France, 1993 (Baroudeur) OF93143 Trial RA90	WG	0.75		1000	1	0 7 14 21 28 35	leaves	120 9.5 1.54 0.44 0.19 0.17
France, 1993 (Baroudeur) OF93143 Trial RA91	WG	0.75		1000	1	0 7 14 21 28 35	leaves	22 1.8 0.38 0.19 0.11 0.06
France, 1993 (Recital) OF93111 trial DE93	WG included propiconazole	0.60		400	3	61	wheat straw	0.13
France, 1993 (Soisson) OF93111 trial GD91	WG included propiconazole	0.60		400	3	69	wheat straw	<0.05
France, 1993 (Soisson) OF93111 trial LD94	WG included propiconazole	0.60		400	3	77	wheat straw	<0.05
France, 1994 (Florence Aurore) OF94122 trial BY05	WG included fenpropidin	0.38		390	2	42	wheat straw	0.52 c 0.05
France, 1994 (Recital) OF94122 trial SJ92	WG included fenpropidin	0.38		400	2	38	wheat straw	0.39 c 0.07
France, 1994 (Rossini) OF94122 trial GD95	WG included fenpropidin	0.38		390	2	41	wheat straw	0.19 c 0.05
France, 1994 (Sederer) OF94104 trial DE05	EC included propiconazole	0.60		400	2	43	wheat straw	0.95
France, 1994 (Soisson) OF94104 trial LD95	EC included propiconazole	0.60		400	2	42	wheat straw	0.26
France, 1994 (Soissons) OF94122 trial LD92	WG included fenpropidin	0.38		390	2	42	wheat straw	0.22 c 0.05
France, 1995 (Récital) OF95107 trial SJ85	WG included fenpropidin	0.38		400	2	41	wheat straw	0.74
France, 1995 (Scipion) OF95107 trial KJ27	WG included fenpropidin	0.38		400	2	41	wheat straw	0.24
France, 1995 (Tremi) OF95107 trial LD20	WG included fenpropidin	0.38		400	2	42	wheat straw	0.59
France, 1997 (Ami) 2208/97	WG included cyproconazole	0.60		400	2	42	wheat straw	0.71
France, 1997 (Aztec) 2211/97	WG included cyproconazole	0.60		400	2	46	wheat straw	0.32
France, 1997 (Eureka) 2219/97	WG included cyproconazole	0.60		400	2	43	wheat straw	1.1
France, 1997 (Hugo) 2217/97	WG included cyproconazole	0.60		400	2	45	wheat straw	0.65
France, 1997 (Sideral) 2210/97	WG included cyproconazole	0.60		400	2	44	wheat straw	0.28
France, 1997 (Soissons) 2209/97	WG included cyproconazole	0.60		400	2	46	wheat straw	0.32
France, 1997 (Tremie) 2218/97	WG included cyproconazole	0.60		330	2	42	wheat straw	0.22
France, 1997 (Victo) 2216/97	WG included cyproconazole	0.60		400	2	45	wheat straw	0.58
France, 1998 (Arstar) 9812901	WG included cyproconazole	0.60	0.15	410 +420	2	47	wheat straw	5.8 c 0.14
France, 1998 (Primadur) 9812902	WG included cyproconazole	0.60	0.15	400	2	45	wheat straw	2.5 c 0.06
Germany, 1995 (Appollo) 2151/95 gr 62695	EC included propiconazole	0.5		400	2	0 21 27 36 49	whole plant stalks stalks wheat straw wheat straw	7.7 0.76 0.76 0.38 0.19

WHEAT STRAW AND FODDER Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Germany, 1995 (Astron) gr 32895 2172/95	WG included CGA 245704	0.5		400	1	0 20 48 88	whole plant whole plant stalks wheat straw	11 0.34 <0.10 <0.10
Germany, 1995 (Zentos) 2150/95 gr 12695	EC included propiconazole	0.5		400	2	0 21 28 35 49	whole plant stalks stalks wheat straw wheat straw	5.5 0.36 0.62 0.95 <0.10
Germany, 1995 (Zentos) gr 12895 2171/95	WG included CGA 245704	0.5		400	1	0 21 48 104	whole plant whole plant whole plant wheat straw	12 0.35 <0.10 <0.10
Germany, 1996 (Contra) IF-96/07964-00	EC included propiconazole	0.50		300	2	0 21 42 49 55	whole plant whole plant whole plant wheat straw wheat straw	10 0.79 0.42 0.54 0.41
Germany, 1996 (Ritmo) IF-96/07965-00	EC included propiconazole	0.50		300	2	0 22 42 49 55	whole plant whole plant whole plant wheat straw wheat straw	9.0 0.48 0.12 <0.05 0.06
Germany, 1997 (Ritmo) IF-97/09996-00	WG	0.72 +0.78		290 +310	2	0 22 43 48 55	whole plant whole plant whole plant wheat straw wheat straw	12 1.1 0.52 0.10 0.07
Germany, 1997 (Ritmo) IF-97/09998-00	WG	0.73 +0.77		290 +310	2	0 21 42 50 56	whole plant whole plant whole plant wheat straw wheat straw	8.6 0.40 0.42 0.31 0.14
Germany, 1998 (Alidos) gr 34598	WG included cyproconazole	0.60		400	2	0 20 42 48 54	whole plant stalks stalks wheat straw wheat straw	3.3 2.5 2.1 1.7 1.0
South Africa, 1991 (Palmiet) 2092/91	WG	0.75	0.17	440	1	0 4 7 14 21 28 0	whole plant whole plant whole plant whole plant whole plant wheat stalks whole plant	14 9.0 5.4 3.0 1.4 0.58 c 0.33
Switzerland, 1990 (Arina) 2020/90	WP	0.50		500	2	45	wheat straw	0.088
Switzerland, 1993 (Arina) 2019/93	WG included propiconazole	0.60	0.12	500	2	56	wheat straw	0.19
UK, 1991 (Apollo) CSTR/029:1B	WG	0.75		200	2	31 59	wheat straw	0.34 0.39
UK, 1991 (Mercia) CSTR/029:1B	WG	0.75		200	2	54 63 54	wheat straw	1.0 0.59 c 0.05
UK, 1991 (Riband) CSTR/029:1B	WG	0.75		200	2	49 55 49	wheat straw	0.50 0.33 c 0.06

WHEAT STRAW AND FODDER Location, year (variety), report No.	Application					Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.		
UK, 1995 (Apollo) FR0195AR. 1/	EC included propiconazole	0.51		200	2	0 green plant 7 green plant 14 green plant 28 green plant 42 green plant 50 wheat straw	8.1 3.4 1.8 2.2 2.8 1.8
UK, 1995 (Apollo) FR0195AR. 1/	WG	0.51		200	2	50	wheat straw	2.8
UK, 1997 (Hunter) FR1397	WG	0.75 +0.50	0.037 +0.025	200	2	58	wheat straw	0.06
UK, 1997 (Hussar) FR1497	WG	0.75 +0.50	0.037 +0.025	200	2	54	wheat straw	<0.05

1/ FR0195AR: no field reports, not credible, study cannot be evaluated.

c: sample from control plot.

Table 46. Cyprodinil residues in almond hulls resulting from supervised trials in the USA.

ALMONDS Location, year (variety), report No.	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
USA (CA), 1995, (Carmel) 02-FR-037-95	WP	0.56		2700	3	151	almond hulls	<0.05
USA (CA), 1995, (Mission) 0W-FR-520-95	WP	0.56		2700-3300	4	150	almond hulls	<0.05
USA (CA), 1995, (Butte) 0W-FR-423-95	WP	0.56		3000-3100	4	150	almond hulls	<0.05
USA (CA), 1995, (Mission) 0W-FR-424-95	WP	0.56		2800-3000	4	150	almond hulls	<0.05
USA (CA), 1995, (Non-pariel) 0W-FR-422-95	WP	0.56		2700-2900	4	150	almond hulls	<0.05

Farm animal feeding studies

The meeting received a lactating dairy cow feeding study, which provided information on likely residues resulting in animal tissues and milk from residues in the animal diet.

Groups of 3 lactating Holstein cows (animals weighing 500-636 kg) were dosed daily, *via* gelatin capsule, with cyprodinil at 105, 315, and 1050 mg/cow/day, equivalent to levels of 5, 15 and 50 ppm dry-weight in the diet, for 28 consecutive days (van Geluwe, 1995s). Milk was collected twice daily for analysis. On days 28, 29 and 30, a cow from each dosing group was slaughtered for tissue collection. Tissues collected for analysis were liver, kidney, perirenal fat, omental fat, round muscle and tenderloin muscle. Animals consumed approximately 19-21 kg dry-weight feed each per day. Samples were analyzed by HPLC method AG-635.

Cyprodinil residues were not detected (LOQ 0.01 mg/kg) in the milk (days 0, 1, 3, 7, 14 and 21), kidney or fat of cows from the highest dose group (50 ppm) and so samples from the other groups were not analyzed (Table 47). Residues were also not detected in milk (day 26) or muscle from the three dose groups. Cyprodinil was present in liver (highest 0.013 mg/kg) from the highest dose group but not in liver from the other groups.

Table 47. Residues of cyprodinil in milk and tissues of dairy cows, resulting from dosing with cyprodinil at the equivalent of 5, 15 and 50 ppm dry-weight in the diet, for 28 consecutive days (van Geluwe, 1995s).

Tissue or milk	Cyprodinil residues, mg/kg		
	Feeding level		
	5 ppm dry weight	15 ppm dry weight	50 ppm dry weight
Liver	<0.01 (3)	<0.01 (3)	0.013 0.011 <0.01
Kidney	na	na	<0.01 (3)
Perirenal fat	na	na	<0.01 (3)
Omental fat	na	na	<0.01 (3)
Muscle, round	<0.01 (3)	<0.01 (3)	<0.01 (3)

Tissue or milk	Cyprodinil residues, mg/kg		
	Feeding level		
	5 ppm dry weight	15 ppm dry weight	50 ppm dry weight
Muscle, tenderloin	<0.01 (3)	<0.01 (3)	<0.01 (3)
Milk, day 1	na	na	<0.01 (3)
Milk, day 3	na	na	<0.01 (3)
Milk, day 7	na	na	<0.01 (3)
Milk, day 14	na	na	<0.01 (3)
Milk, day 21	na	na	<0.01 (3)
Milk, day 26	<0.01 (3)	<0.01 (3)	<0.01 (3)

na: not analyzed.

FATE OF RESIDUES IN STORAGE AND PROCESSING

The meeting received information on the fate of cyprodinil residues during the brewing of beer, production of fruit juices, vinification, wheat milling and baking, drying of prunes and raisins, and the production of strawberry jam and tomato paste. A study was provided on the fate of cyprodinil subjected to the hydrolysis conditions likely during commercial food processing.

Morgenroth (2001a) investigated the hydrolysis of [2-^{14}C-pyrimidine]cyprodinil under conditions representing food processing operations, to determine possible degradation products. The tests were designed to simulate hydrolysis conditions during pasteurization (pH 4, 90°C, 20 min), baking, brewing or boiling (pH 5, 100°C, 60 min) and sterilization (pH 6, 120°C, 20 min). Cyprodinil was not degraded by the test conditions. It was hydrolytically stable under food processing conditions.

Wheat was processed to bran and flour in a pilot plant, simulating common industrial practice, in a trial in Germany (Schulz, 1997c). Schulz (1998a & 1998b) described the process, which simulated in a pilot plant the milling of wheat, as in the common industrial procedure. The process included cleaning, conditioning, milling into straight flour and bran, separation of low grade meal from bran, and blending of meal and flour to produce a flour with 0.51 to 0.63% minerals, corresponding to flour type 550.

Walser (1997b & 1997c) described the processing of strawberries into jam and preserve, on a small scale (1 kg) in a typical household procedure. The processes included washing the fruit and boiling in sugar solutions. Pointurier (2001g, 0-11101) described similar processes, where 0.8 kg and 2.4 kg of strawberries were used.

Salvi (2002b) washed and de-stoned plums by hand, dipped them in 0.5% sorbic acid and then dried them at 65°C, to produce prunes with a moisture level no higher than 25%. Chopped plums were also boiled in a sugar solution to produce a purée.

Tomato fruits were manually washed with cold running water and quartered and blanched at 90ºC for 3 minutes, then mashed and separated by centrifuge into juice and pomace (Tribolet, 2000c). Juice was concentrated at 70-80ºC under vacuum to produce paste. Tomatoes were blanched for 1 minute at 75-85ºC and peeled and sterilized in an autoclave, to produce preserves. Walser (1995d) simulated, on a laboratory scale (processing of 5 kg), the industrial processing of tomatoes to juice.

Table 48. Fate of cyprodinil residues during food processing.

Raw commodity, location, year (variety), report No	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Plums, Germany, 1998 (Hauszwetsche, Schäfer), household processing gr 90898	WG included fludioxonil	0.38		1500	3	17	washed fruit wet pomace juice jam puree preserves prunes (<25 % moisture)	0.27 0.41 0.046 mg/l 0.13 0.18 0.12 0.45

Raw commodity, location, year (variety), report No	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Plums, Switzerland, 2000, (Fellenberg) 2012/00	WG included fludioxonil	0.23	0.024	930	3	14	plums plums, washed plum puree prunes	0.11 0.098 0.10 0.25
Prunes, USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	0.56		2700	5	1	fruit dried prunes	0.22 0.26
Prunes, USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	1.7		2700	5	1	fruit dried prunes	0.82 1.2
Prunes, USA (CA), 1994 (French Prunes) 02-FR-035-94	WP	2.8		2700	5	1	fruit dried prunes	1.2 1.3
Prunes, USA (OR), 1994 (Brooks) OW-FR-648-94	WP	0.56		1500	5	3	fruit dried prunes	0.11 0.16
Prunes, USA (OR), 1994 (Brooks) OW-FR-648-94	WP	1.7		1500	5	3	fruit dried prunes	0.23 0.60
Prunes, USA (OR), 1994 (Brooks) OW-FR-648-94	WP	2.8		1500	5	3	fruit dried prunes	0.62 1.7
Strawberries, France, 2000, (Chandler), greenhouse 0011101	WG included fludioxonil	0.38	0.094	400	3	3	strawberry strawb, washed strawb jam strawb preserves strawb juice	0.36, c 0.01 0.27, c 0.01 0.18, c 0.01 0.30, c 0.01 0.065
Strawberries, Germany, 1996 (Korona) 2188/96	WG included fludioxonil	0.38		2000	3	10	strawberry strawb, washed strawb preserves strawb jam	0.53 0.32 0.30 0.10
Strawberries, Germany, 1996 (Senga-Sengana) 2187/96	WG included fludioxonil	0.38		2000	3	10	strawberry strawb, washed strawb preserves strawb jam	0.21 0.19 0.16 0.12
Tomatoes, Italy, 1995, (114), covered crop, tunnel 2090/95	WG included fludioxonil	0.38		1000	3	21	fruit tomato juice	0.02 0.005
Tomatoes, Switzerland, 1999, (Petula) 2126/99	WG included fludioxonil	0.38	0.025	1500	3	7	fruit washed fruits wet pomace raw juice pasteurized juice raw paste pasteurized paste peeled tomatoes preserves	0.106 0.064 0.027 0.67 0.40 0.016 0.019 0.018 0.019 0.078 0.11 0.068 0.11 <0.02 <0.02 <0.01 <0.01
Wheat, Germany, 1996 (Contra) IF-96/07964-00	EC included propiconazole	0.50		300	2	55	grain flour bran	0.03 <0.02 0.09
Wheat, Germany, 1997 (Ritmo) IF-97/09996-00	WG	0.72 +0.78		290 +310	2	55	grain flour bran	<0.02 <0.02 <0.02
Wheat, Germany, 1997 (Ritmo) IF-97/09998-00	WG	0.73 +0.77		290 +310	2	50	grain flour bran	0.06 0.02 0.12

Raw commodity, location, year (variety), report No	Application					PHI, days	Commodity	Residues, mg/kg
	Form	kg ai/ha	kg ai/hl	water, l/ha	no.			
Wheat, Switzerland, 2000 (Arina) 2013/00	WG	0.75 +1.0	0.015 +0.020	500	2	36	grain cleaned grain coarse bran fine bran straight flour total bran flour (type 550) whole meal flour whole-grain bread	0.16 0.14 0.46 0.39 0.04 0.38 0.043 0.14 0.080

Table 49. Residues and processing factors for the production of malt, wort and beer from barley. Data are from residue trials recorded in Table 39.

Trial	Residues, mg/kg				Processing factors		
	Barley	Malt	Wort	Beer	Malt	Wort	Beer
9715702	0.175	0.24	<0.02	<0.01	1.37	<0.11	<0.06
OF96142	0.4	0.445	<0.02		1.11	<0.05	
OF96142	0.4	0.535	<0.02		1.34	<0.05	
gr 44598	0.34	0.3		<0.005	0.88		<0.01
gr 42298	0.03	0.03		<0.005	1.00		<0.17
gr 43498	0.17	0.16		<0.005	0.94		<0.03
OF95151	0.07	0.07	<0.01		1.00	<0.14	
OF95151	0.13	0.11	<0.01		0.85	<0.08	
OF95151	0.58	0.63	<0.01		1.09	<0.02	
OF95151	0.75	0.73	<0.01		0.97	<0.01	
9715401	0.06	0.1	<0.02	<0.01	1.67	<0.33	<0.17
9715801	0.1	0.14	<0.02	<0.01	1.40	<0.20	<0.10
9715701	0.36	0.42	<0.02	<0.01	1.17	<0.06	<0.03
9715002	0.19	0.29	<0.02	<0.01	1.53	<0.11	<0.05
9715402	0.39	0.41	<0.02	<0.01	1.05	<0.05	<0.03
9715802	0.25	0.38	<0.02	<0.01	1.52	<0.08	<0.04
9810401	0.67	0.94	<0.01	<0.01	1.40	<0.01	<0.01
9810302	0.74	0.82	<0.01	<0.01	1.11	<0.01	<0.01
9810301	0.85	0.97	<0.01	<0.01	1.14	<0.01	<0.01
9810402	0.28	0.47	<0.01	<0.01	1.68	<0.04	<0.04
2025/99	0.14	0.17	<0.02	<0.002	1.21	<0.14	<0.01
2023/99	1.1	1.2	<0.02	<0.002	1.09	<0.02	<0.002
2026/99	0.11	0.1	<0.02	<0.002	0.91	<0.18	<0.02
				n=24	Mean = 1.2		estimate <0.01

Table 50. Residues and processing factors for grapes. Data are from residue trials recorded in Table 28. Mean values do not include processing factors calculated from non-detects ("less-than" values).

Reference	Residues, mg/kg							Processing factors					
	grapes	juice	wine	wet pomace	dry pomace	raisins	must	juice	wine	wet pomace	dry pomace	raisins	must
02-FR-038-95	0.33	0.082		7.5	22	0.70		0.25		23	67	2.1	
02-FR-038-95	2.2	0.46		48	104			0.21		22	48		
02-FR-038-95	4.5	0.73		91	206			0.16		20	45		
2049/95	1.4	0.18	0.16					0.13	0.12				
2050/95	2.2	0.45	0.30					0.21	0.14				
2057/94	1.9	0.25	0.16					0.13	0.084				

Reference	Residues, mg/kg							Processing factors					
	grapes	juice	wine	wet pomace	dry pomace	raisins	must	juice	wine	wet pomace	dry pomace	raisins	must
2058/94	0.94	0.15	0.12					0.16	0.13				
2059/94	1.5	0.10	0.08					0.067	0.053				
2218/95	0.51	0.090				0.45		0.18				0.9	
2219/95	0.40	0.079				0.52		0.20				1.3	
2220/95	0.36	0.070				0.44		0.19				1.2	
2222/95	0.53	0.085				0.65		0.16				1.2	
2223/95	0.59	0.070				0.97		0.12				1.6	
2224/95	0.45	0.058				1.5		0.13				3.2	
2225/95	0.3	0.030				1.1		0.10				3.7	
2226/95	0.25	0.040				1.0		0.16				4.2	
2227/95	0.52	0.048				1.3		0.092				2.5	
2228/95	1.3	0.18				2.3		0.14				1.8	
2229/95	0.89	0.086				2.0		0.10				2.2	
OF94143, FP17	0.17	0.02	0.02				0.13	0.12	0.12				0.76
OF94143, LA20	0.24	<0.01	0.01				0.14		0.042				0.58
OF94143, TH88	0.31	0.03	0.04				0.11	0.10	0.13				0.35
OF94143, TP87	0.16	0.02	0.02				0.12	0.13	0.13				0.75
2007/96	0.54		0.044				0.13		0.081				0.25
2008/96	0.59		0.041				0.13		0.069				0.23
2042/91	0.51		0.037						0.073				
2042/91	0.51		0.042						0.081				
2043/91	1.4		0.085						0.063				
2043/91	1.4		0.099						0.073				
2049/95	1.4		0.006						0.004				
2050/95	2.2		0.18						0.083				
2057/94	1.9		0.22						0.12				
2058/94	0.94		0.022						0.023				
2059/94	1.5		0.006						0.004				
2066/96	0.64		0.036						0.056				
2066/96	0.64		0.042				0.067		0.066				0.10
2101/94	0.93		0.049						0.053				
2101/94	0.93		0.067						0.072				
2109/94	0.75		0.012						0.016				
2109/94	0.75		0.02				0.019		0.027				0.025
2119/90	1.6		0.20						0.12				
2119/90	1.6		0.24						0.15				
2121/90	3.3		0.13						0.038				
2121/90	3.3		0.17						0.052				
2122/90	3.5		0.18						0.051				
2122/90	3.5		0.20						0.056				
2153/94	0.58		<0.005				0.059						0.10
2154/94	0.61		0.005				0.022		0.008				0.04
2164/95	0.64		<0.005				0.09						0.14
2164/95	0.64		<0.005										
2165/95	0.69		0.007						0.010				
2165/95	0.69		<0.005				0.047						0.068
2406/97	0.10		0.006						0.060				
2408/97	0.20		0.009						0.045				
OF93157, DE90	0.15		0.02						0.13				
OF94141, AC19	0.06		<0.01	2.6			0.04			43			0.67
OF94141, BY14	0.18		0.01	7.9			0.15		0.056	44			0.83
OF94141, DE19	0.12		0.01	4.3			0.16		0.083	36			1.3

Reference	Residues, mg/kg							Processing factors					
	grapes	juice	wine	wet pomace	dry pomace	raisins	must	juice	wine	wet pomace	dry pomace	raisins	must
OF94141, GD87	0.33		0.02	4.8			0.05		0.061	15			0.15
OF94141, LA21	0.02		<0.01	0.26			<0.02			13			
OF94141, SJ82	0.36		0.06	7.5			0.34		0.17	21			0.94
OF94141, TH87	0.37		0.06	12.1			0.22		0.16	33			0.59
OF94141, TP86	0.05		<0.01	0.28			0.04			6			0.80
OF95122, KJ47	0.49		0.09						0.18				
OF95123, BY87	0.29		0.02						0.069				
OF95123, KJ46	0.44		0.06						0.14				
OF95123, TP14	0.36		0.02						0.056				
OW-FR-425-95	1.4					1.4						1.1	
OW-FR-425-95	2.8					5.6						2.0	
OW-FR-425-95	8.9					20						2.3	
							Mean	0.15	0.078	25	53	2.1	0.46
							n	22	46	11	3	15	19

Table 51. Calculated processing factors for cyprodinil residues in apples, apricots, plums, strawberries, tomatoes and wheat.

Commodity	Residue	PF	Residue	PF	Residue	PF	Residue	PF	Residue	PF	Mean PF
APPLES	0.012		0.066		0.213		<0.02		0.066		
apples, washed	0.023	1.9	0.07	1.1	0.194	0.9			0.070	1.1	
wet pomace	0.029	2.4	0.275	4.2	0.702	3.3	0.03	>1.5	0.28	4.2	
juice	<0.01	<0.8	0.002	0.03	0.007	0.033	<0.005		<0.01	<0.15	
APPLES	0.21		0.02		<0.02		0.026				
apples, washed	0.19	0.90	<0.02	<1	0.027		0.047	1.8			1.3
wet pomace	0.70	3.3	0.049	2.5	0.10	>5	0.12	4.6			3.5
juice	<0.01	<0.05	<0.01	<0.5	<0.01		<0.01	<0.4			0.03
APRICOTS	0.185										
juice	0.082	0.44									0.44
PLUMS	0.14		0.075		0.27		0.11		0.11		
dried fruit, prunes	0.15	1.07	0.095	1.27	0.45	1.7	0.248	2.3	0.16	1.5	
PLUMS	0.23		0.62		0.22		0.82		1.17		
dried fruit, prunes	0.60	2.6	1.68	2.7	0.26	1.2	1.22	1.5	1.33	1.1	1.7
STRAWBERRIES	0.36										
strawberry washed	0.27	0.75									0.75
strawberry jam	0.183	0.51									0.51
strawberry preserves	0.298	0.83									0.83
strawberry juice	0.065	0.18									0.18
TOMATOES	0.106										
washed fruits	0.0455	0.43									0.43
wet pomace	0.534	5.04									5.04
raw juice	0.0175	0.17									0.17
pasteurized juice	0.0185	0.17									0.17
raw paste	0.094	0.89									0.89
pasteurized paste	0.091	0.86									0.86
peeled tomatoes	<0.02	<0.19									<0.19
preserves	<0.01	<0.09									<0.09
WHEAT GRAIN	0.16										
cleaned grain	0.14	0.90									0.90
coarse bran	0.46	2.97									3.0
fine bran	0.39	2.52									2.5
straight flour	0.040	0.26									0.26
low grade meal	0.33	2.13									2.1

Commodity	Residue	PF	Residue	PF	Residue	PF	Residue	PF	Residue	PF	Mean PF
bran (total bran)	0.38	2.47									2.5
flour (type 550)	0.043	0.27									0.27
total bran WM	0.45	2.90									2.9
straight flour WM	0.080	0.52									0.52
whole meal flour	0.14	0.92									0.92
whole-grain bread	0.080	0.52									0.52

PF: processing factor.

Table 52. Calculated processing factors for cyprodinil residues.

Raw commodity	Processed commodity	Processing factor (PF)
Apples	wet pomace	3.5
	juice	0.03
Apricot	juice	0.44
Barley	beer	<0.01
Grapes	juice	0.15
	wine	0.078
	dry pomace	53
	raisins	2.1
Plums	dried prunes	1.7
Strawberry	jam	0.51
Tomatoes	juice	0.17
	paste	0.86
Wheat	bran	3.0
	flour	0.27
	whole meal flour	0.92
	whole-grain bread	0.52

RESIDUES IN FOOD IN COMMERCE OR CONSUMPTION

Monitoring data

No monitoring data for cyprodinil were available.

NATIONAL RESIDUE LIMITS

The Meeting was aware of the MRLs given in Table 53. All national residue definitions: cyprodinil.

Table 53. National MRLs for cyprodinil.

Country	MRL	Commodity
Australia	5	Raisins
	2	Grapes
	0.5	Stone fruits
	0.05	Pome fruits
Austria	2	Barley, grapes, lettuce
	1	Apple, pears, strawberries
	0.5	Beans, peppers, tomatoes, wheat
	0.2	Cucumbers, summer squash
Belarus	0.05	Apples
Belgium	2	Grapes
	0.5	Strawberries
	0.2	Wheat
	0.1	Barley
	0.02	Apples
Bolivia	1	Grapes
	0.5	Cucumbers, lettuce, strawberries, tomatoes
	0.2	Wine
Brazil	1	Apples
	0.5	Tomatoes
	0.05	Onions, bulb, potatoes

Country	MRL	Commodity
Canada	3	Raisins
	2	Cherries, grapes, nectarines, peaches, stone fruits
	0.1	Pome fruit
	0.02	Almonds
Chile	1	Apples
Croatia	1	Pome fruit
	0.01	Grapes
Cyprus	1	Grapes
	0.2	Wine
Czech Republic	1	Pome fruit
Denmark	0.1	Barley
	0.05	Rye, wheat
Estonia	1	Pome fruit
France	10	Lettuce
	2	Barley, strawberries
	1	Grapes
	0.5	Apricots, beans, cereals, peaches, plums, wheat
	0.2	Peas, wine
	0.1	Peas
	0.02	Apples
Georgia	0.04	Apples
Germany	2	Grapes
	1	Strawberries
	0.5	Peaches
Germany (cont.)	0.3	Bean pods, rye, wheat
	0.1	Beans
	0.05	Apples, pears
Hungary	0.5	Pome fruit
	0.05	Cherries
	0.02	Wine
Israel	1	Strawberries
	0.5	Cucumbers, tomatoes
Italy	10	Lettuce
	5	Grapes
	2	Strawberries
	1	Apples, pears
	0.5	Apricots, cherries, cucumbers, egg plants, nectarines, peaches, peppers, plums, summer squash, tomatoes, wine
Japan	5	Apples, grapes, pears, Japanese
	2	Apricots, barley, blackberries, cherries, nectarines, peaches, plums, raspberries
	1	Lettuce, strawberries
	0.5	Buckwheat, cereals, maize, rye, tomatoes, wheat
	0.1	Beans, loquats, mandarins, peas, soya beans
	0.05	Onions
	0.02	Almonds
Korea (South)	1	Strawberries
	0.5	Apples
Latvia	0.5	Pome fruits, stone fruits
Lebanon	3	Grapes
Lithuania	1	Pome fruits, grapes
Luxembourg	0.5	Strawberries
	0.2	Wheat, wine
	0.1	Barley
Macedonia	1	Pome fruit
Moldavia	0.04	Apples, pears, pome fruit
Netherlands	0.05	Apples, pears
Norway	1	Strawberries
	0.1	Barley, wheat
Paraguay	1	Grapes

Country	MRL	Commodity
	0.5	Lettuce, peppers, strawberries, tomatoes
	0.2	Wine
Portugal	5	Grapes
	3	Strawberries
	0.5	Tomatoes
	0.2	Wine
	0.05	Apples, pears
Romania	0.01	Grapes
Russia	0.04	Pome fruit, apples
Slovak Republic	1	Pome fruit
Slovenia	1	Pome fruit, stone fruits
	0.01	Grapes
South Africa	0.1	Apples
	0.05	Grape, wine
Spain	2	Grape, lettuce
	1	Pears, strawberries
	0.5	Cucurbits, egg plants, peppers, tomatoes
	0.3	Grape juice
	0.2	Beans
	0.1	Wine
Switzerland	3	Grapes
	2	Blackberries, raspberries
	1	Lettuce
	0.5	Cucumbers, egg plants, stone fruits, strawberries, tomatoes, wine
	0.3	Barley, wheat
Switzerland (cont.)	0.1	Pome fruit, beans
	0.05	Onions, bulb
Taiwan	1	Grapes, mangoes, muskmelons, pears
	0.2	Wine
Turkey	1	Grapes
	0.5	Tomatoes
	0.2	Wine
Ukraine	0.05	Apples, pears
United States	3	Raisins
	2	Grapes, stone fruits
	0.15	Apple pomace
	0.05	Almond hulls
	0.02	Almond, kernels
Uruguay	5	Grapes
	0.5	Cucumbers, lettuce, strawberries, tomatoes, wine
Yugoslavia	1	Apples
	0.5	Cherries

APPRAISAL

Residue and analytical aspects of cyprodinil were considered for the first time by the present Meeting.

Cyprodinil, a member of the anilinopyrimidine group, is a systemic foliar and seed dressing fungicide, that acts as an inhibitor of methionine biosynthesis. It has registered uses in many countries on horticultural and cereal crops.

The Meeting received information on cyprodinil metabolism and environmental fate, methods of residue analysis, freezer storage stability, national registered use patterns, supervised residue trials, farm animal feeding studies, fate of residues in processing and national MRLs.

Cyprodinil, ^{14}C-labelled in the phenyl ring or at C2 of the pyrimidine ring, was used in all the metabolism studies.

Animal metabolism

The Meeting received animal metabolism studies on rats, lactating goats and laying hens. The most common metabolic pathways in animals began with hydroxylation of the methyl group, or at position 5 on the pyrimidine ring, or at position 4 on the phenyl ring. Typically, the hydroxy compounds form sulfate or glucuronic acid conjugates, ready for elimination. Parent cyprodinil was a minor part of the residue and was identified in goat liver, fat and muscle and in eggs. Cleavage of the amino bridge was minor. Metabolism of cyprodinil in rats and farm animals was similar.

Rats. When rats were orally dosed with labelled cyprodinil, almost all (92-97%) of the radiolabel was excreted within 48 hours. Most of the radiolabel excretion was in the urine (48-68%) with 29-47% in the faeces. A major metabolite in faeces was identified as (6-cyclopropyl-2-phenylamino-pyrimidin-4-yl)methanol. Fifteen metabolites and parent cyprodinil were identified in the tissues of orally dosed rats. The metabolites were mostly mono-, di- and tri-hydroxy compounds, present as sulfate or glucuronic acid conjugates. The most common sites for hydroxylation were 4-phenyl, 5-pyrimidine and the 6-methyl group. Cleavage of the amine bridge was a minor route.

Goats. Lactating dairy goats were dosed orally once daily for 4 consecutive days, by gelatin capsule, with 0.2 mg/kg bw/day of [^{14}C-phenyl]cyprodinil and 0.19 mg/kg bw/day [2-^{14}C-pyrimidine]cyprodinil, equivalent to 8.0 and 8.9 ppm cyprodinil in the diet, respectively. A parallel, high-dose study was conducted with 9.9 and 9.8 mg/kg bw/day, equivalent to 267 and 286 ppm cyprodinil in the diet, respectively. In the low-dose goats, 0.13% and 0.53% of the dose was found in the milk. In the high-dose animals, ^{14}C levels were much higher in liver and kidney (0.17-0.28 mg/kg as cyprodinil) than in muscle or fat (0.006-0.01 mg/kg). In the low-dose animals, parent cyprodinil at 0.003 (1.7% TRR, total radioactive residue) and 0.016 mg/kg (5.8% TRR) was identified in liver but not in other tissues. Hydroxylated and conjugated metabolites (4-phenyl and 5-pyrimidine) were identified in the milk, kidney and liver.

Lactating dairy goats were dosed orally, directly into the rumen, once daily for 4 consecutive days, by gelatin capsule, with [^{14}C-phenyl]cyprodinil at 4.1 mg/kg bw, equivalent to 100 ppm cyprodinil in the diet. Most of the metabolites were products of hydroxylation at the 4-position in the phenyl ring, the 5-position in the pyrimidine ring and on the methyl group, which then formed glucuronic acid or sulfate conjugates. Parent cyprodinil was the major component of the residue in fat (68% TRR). No cyprodinil was detected in milk, but 57% of the residue in milk was accounted for by the metabolite 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol and its glucuronic acid and sulfate conjugates. Metabolites identified in goat tissues and milk were mostly the same as in rat tissues.

Hens. Laying White Leghorn hens were dosed orally once daily for 4 consecutive days, by gelatin capsule, at 0.4 mg/kg bw of [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil, equivalent to 4.7 and 4.5 ppm cyprodinil in the diet, respectively. Radiolabel was present at higher levels in the liver and kidney (0.041-0.12 mg/kg) than in other tissues or eggs (0-0.01 mg/kg). A parallel high-dose study was conducted with 19 mg/kg bw/day, equivalent to 215 and 226 ppm cyprodinil in the diet, respectively. Elimination of the ^{14}C was rapid, with 98% and 2% of the daily dose recovered in excreta and cage wash, respectively, in the first 24 hours.

The ^{14}C level in meat was too low for identification. The nature of the residue in skin and fat was also not further examined. Parent cyprodinil was not identified in liver, the tissue with the highest level of ^{14}C. The main identified components of the liver residue were glucuronic acid and sulfate conjugates of 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol. Cyprodinil was present at low levels in eggs (0.002 mg/kg in whites to 0.011 mg/kg in yolks, 8-12% TRR) from the high-dose experiment.

Plant metabolism

The Meeting received plant metabolism studies on wheat, apples, peaches, tomatoes and potatoes. Cyprodinil parent was quite persistent and was generally the major identifiable component of residues. Cyprodinil was slowly absorbed into the plant tissue where it was hydroxylated and

conjugated with sugars. Cleavage of the amino bridge was minor. In apples, much of the residue remained in the peel. Similar metabolic pathways occurred in the crops studied.

Wheat. When wheat plants were treated with [2-^{14}C-pyrimidine]cyprodinil and [^{14}C-phenyl]cyprodinil, at 0.75 kg ai/ha at the 6-8 leaf stage and again at the panicle emergence stage at 0.5 kg ai/ha, levels of parent cyprodinil at harvest were: grain 0.018 and 0.022 mg/kg, husks 0.37 and 0.44 mg/kg and straw 0.60 and 0.44 mg/kg. Cyprodinil was the major identifiable component of the residue. The pattern of extractable metabolites in wheat straw, from ^{14}C labelling in the two positions, was generally similar, demonstrating that the amino bridge was mostly intact. Hydrolysis experiments suggested the presence of *O*- and *N*-sugar conjugates. Sugar conjugates were identified in straw, husks and grain.

Wheat plants at the 5-leaf stage were treated once with [^{14}C-phenyl]cyprodinil, at a rate of 0.75 kg ai/ha, in a greenhouse experiment which demonstrated: a half-life of approximately 25 days for parent cyprodinil in the wheat plant; approximately 50% loss of radiolabel in 35 days by volatility and transpiration; slow but continued uptake of cyprodinil; and very little translocation to new growth.

Peaches. When peach trees were sprayed with either [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil and peaches were harvested 1 day after the final application, cyprodinil constituted the major part of the residues. Metabolites were mostly sugar conjugates of hydroxylated cyprodinil. The presence of low levels of 4-cyclopropyl-6-methylpyrimidin-2-ylamine showed the occurrence of limited amino bridge cleavage.

Tomatoes. Greenhouse tomato plants were treated with either [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil and tomatoes were harvested 14 days after the second treatment. Cyprodinil was the major part of the residue (55-62%). Approximately 20% of the residue was on the surface, with the remainder having penetrated into the tissues. The metabolic pattern was very similar for the two label positions, showing that the amino bridge had remained intact. Metabolites resulted from hydroxylation at various positions and subsequent conjugation with sugars.

Potatoes. Greenhouse grown potato plants were treated 3 times with foliar sprays of either [^{14}C-phenyl]cyprodinil or [2-^{14}C-pyrimidine]cyprodinil, at 0.56 kg ai/ha, and potato tubers were harvested 14 days after the final treatment. Cyprodinil was not identified as a residue component in the harvested tubers. Phenylguanidine was identified as a metabolite, at 0.004 and 0.005 mg/kg. Also in the tubers, metabolites were identified where the cyclopropyl ring was opened. Total levels of the two compounds, *N*-phenyl-4-(3-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine and *N*-phenyl-4-(2-hydroxypropyl)-5-hydroxy-6-methyl-2-pyrimidinamine and their *O*-sugar conjugates, were 0.015 and 0.018 mg/kg in the two labelling experiments. A portion of the ^{14}C in potatoes (24% from the phenyl label experiment and 13% from the pyrimidine label experiment) was identified as being incorporated into glucose.

Apples. Golden Delicious apple trees, growing in containers, were sprayed 3 times with [2-^{14}C-pyrimidine]cyprodinil, at 0.050 kg ai/hl, and fruit were taken at maturity, 61 days after the final treatment. Of the radiolabel in whole fruit, 16% was identified, 39% was unextracted and 36% was unidentified and unresolved. Very little residue (<1%) remained on the surface but most of this resided in the peel. Parent cyprodinil was the major identified component of the residue, at 0.088 mg/kg (11% of the radiolabel). Identified metabolites were (6-cyclopropyl-2-phenylaminopyrimidin-4-yl)methanol and 4-(4-cyclopropyl-6-methylpyrimidin-2-ylamino)phenol, present as sugar conjugates, and 4-cyclopropyl-6-methylpyrimidin-2-ylamine.

Environmental fate in soil

The Meeting received information on the behaviour and fate of cyprodinil during aerobic metabolism in a number of soils. At 20°C and moisture levels above 60% field capacity, the initial half-life for loss of parent cyprodinil was 11-46 days. Rates of loss decreased substantially as the residues aged. Temperature and moisture levels strongly influenced the rate of disappearance, with longer half-lives at lower temperatures and moisture levels.

In soil, 4-cyclopropyl-6-methyl-pyrimidin-2-ylamine was an important metabolite, demonstrating that amino bridge cleavage occurred readily in soil. This metabolite and parent cyprodinil were sufficiently persistent in soil for residues to be present in the soil at harvest of a root crop.

Hydroxylation at the 3-phenyl position of cyprodinil also produced an important soil metabolite, *N*-(3-hydroxyphenyl)-4-cyclopropyl-6-methylpyrimidin-2-ylamine. This metabolite had a very short half-life (less than 1 day) when it was incubated independently.

Crop rotation

The Meeting received comprehensive data from confined crop rotation studies with ^{14}C-labelled cyprodinil and from crop rotation trials using unlabelled cyprodinil. In some trials a first crop was treated with cyprodinil, while in others bare ground was directly treated with cyprodinil, as an extreme case for residues in the soil from the first crop. The normal rotation in the trials was a first crop of wheat, followed by a rotation crop of a root crop (e.g. sugar beet, radish, turnip), a vegetable (e.g. lettuce, mustard) and a cereal (e.g. wheat, maize). The rotation crops were sown from approximately 30 days to 1 year after the final treatment of the first crop or bare ground.

Residues of cyprodinil itself, at <0.06 mg/kg, were detected in rotation crops where the treatment-to-sowing interval (TSI) was 1-12 months, e.g. in wheat husks (0.01 mg/kg, TSI 106 days), wheat grain (0.003 mg/kg, TSI 119 days) and radish roots (0.001-0.062 mg/kg, TSI 29-366 days).

An important component of the residue at the longer intervals was identified as (2-amino-6-cyclopropyl-pyrimidin-4-yl)methanol. It may result from plant uptake of the soil metabolite, 4-cyclopropyl-6-methyl-pyrimidine-2-ylamine, followed by plant metabolic hydroxylation of the methyl group. These two metabolites were present at 1.5 and 0.5 mg/kg in wheat fodder from a wheat rotation crop sown 119 days after the cyprodinil treatment. Both metabolites were at measurable levels (0.016-0.21 mg/kg) in wheat forage and fodder and radish roots, from crops sown 1 year after cyprodinil application.

In the unconfined rotational crop studies with unlabelled cyprodinil, parent cyprodinil was not detected (<0.01 mg/kg) except in wheat plants (0.01 mg/kg). Metabolites, 2-amino-6-cyclopropyl-pyrimidin-4-ylmethanol and 4-cyclopropyl-6-methylpyrimidin-2-ol, were occasionally detected, in the range of 0.01-0.13 mg/kg.

The unconfined rotational crop studies suggest that cyprodinil itself will very rarely occur as a residue in rotational crops and then at levels around 0.01 mg/kg.

Analytical methods

The Meeting received descriptions and validation data for analytical methods for cyprodinil and metabolite residues in crops and animal commodities. The methods relied on HPLC and GLC and generally achieved LOQs of 0.01-0.02 mg/kg in the crop and animal matrices.

Cyprodinil and the metabolite 6-cyclopropyl-2-phenylamino-pyrimidin-4-ylmethanol were tested through the procedures of the US FDA Pesticide Analytical Manual. The compounds were amenable to detection by GC systems with NP detectors, and were recovered through procedures for non-fatty foods, but not through those for fatty foods.

Washed tomato fruit, from the metabolism study which used [^{14}C-phenyl]cyprodinil, were extracted and analyzed for ^{14}C and for cyprodinil by method REM141.01. The proportion of cyprodinil in the extract, as measured by HPLC, was 47% of the ^{14}C value (43-53%, n = 4). The metabolism study had found 55% of the ^{14}C in tomato fruits remained as unchanged cyprodinil. The good agreement suggests that method REM141.01 quantitatively extracted the incurred residue. Aqueous methanol was used for extraction.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the stability of residues of cyprodinil and the metabolites, 4-cyclopropyl-6-methyl-pyrimidin-2-ol and 2-amino-6-cyclopropyl-pyrimidin-4-ylmethanol, in various

substrates (crops, farm animal commodities and processed commodities) at freezer temperatures for 1-2 years. Cyprodinil residues were generally stable for the duration of the testing, i.e. the decline in residue level was not evident or less than 30%. Stability in peaches was questionable but the low and variable procedural recoveries suggested difficulties with the analyses.

Residues of the metabolite, 2-amino-6-cyclopropyl-pyrimidin-4-ylmethanol, in radish roots were unstable in freezer storage. Levels dropped below 10 % of their initial value within 3 months of freezer storage.

Residue definition

Parent cyprodinil is the major identifiable component of the residue when cyprodinil is used on crops and it is reasonably persistent. It is a very minor component of residues in animal commodities, where it is readily hydroxylated to derivatives that form glucuronic acid and sulfate conjugates. Parent cyprodinil was identified in the liver, fat and muscle of dosed goats and in the eggs from dosed hens.

The cyprodinil log P_{OW} is 4.0, which suggests that cyprodinil is probably fat-soluble. Cyprodinil is metabolized quickly, so that it does not tend to accumulate in fat. In the dairy cow feeding study at 50 ppm feed dry weight, residues were not detected (<0.01 mg/kg) in the fat or muscle, but were just detected (0.013 mg/kg) in the liver. In the goat metabolism, cyprodinil levels were higher in the liver than in the fat. Levels of parent cyprodinil were higher in the fat than in the muscle, so that residues in the fat tissue are appropriate for controlling residues in meat. The Meeting agreed to define cyprodinil as fat-soluble.

The relevant residue for analysis and enforcement is parent cyprodinil. The same residue definition would be used for estimation of dietary intake.

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

The definition applies to plant and animal commodities.

The residue is fat-soluble.

Supervised trials

The Meeting received supervised trials data for apples, pears, stone fruits, grapes, strawberries, raspberries, onions, cucumbers, egg plant, tomatoes, sweet peppers, lettuce, beans, peas, kidney beans, barley, rye, wheat, almonds and straw and fodder of barley, rye and wheat.

In some trials, residues were measured on samples taken just prior to the final application, as well as just after it (the “zero day” residue). The former residue expressed as a percentage of the latter provides a measure of the contribution (“carryover”) of previous applications to the final residue in use patterns involving multiple applications.

In fruits (pears, peaches, plums, grapes, strawberries) the average carryover of residue was approximately 35%, which suggests that 2 applications will likely produce a higher residue level than one application, although 3 or more applications should not produce residue levels significantly different from two. In vegetables, the carryover was lower and less consistent: peas (pods), 0%; beans, lettuce, cucumbers and peppers, approximately 10%; and tomatoes, 36%; suggesting that the number of applications may influence the residue level in tomatoes but probably not in the other crops.

Residue data were evaluated only where labels (or translations of labels) describing the relevant GAP were available to the Meeting.

Apples. No labels were available for the use of cyprodinil on apples in France or Switzerland, so the residue data from those countries could not be evaluated.

GAP on apples in the USA allows 4 foliar applications of 0.26 kg ai/ha until the end of flowering, with 72 days PHI. Cyprodinil residues in apples from 10 USA trials meeting these conditions were (in rank order, median underlined): <0.02 (5), 0.02 (3), 0.022 and 0.024 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in apples of 0.05 and 0.02 mg/kg, respectively.

Pears. Cyprodinil may be applied to pears in Italy at 0.38 kg ai/ha and the fruit harvested 14 days after the final application. In 5 trials in Italy, and one in France that matched Italian GAP, cyprodinil residues in pears were 0.03, 0.05, 0.13, 0.33, 0.51 and 0.61 mg/kg.

In Spain, cyprodinil may be used on pears at 0.38 kg ai/ha with harvest permitted 14 days after the final application. In 2 trials matching Spanish GAP, the cyprodinil residues were 0.19 and 0.34 mg/kg.

Cyprodinil may be used at 0.26 kg ai/ha on pears in the USA, with a PHI of 72 days. In 6 USA trials matching GAP, cyprodinil residue levels were: <0.02 (4), 0.025 and 0.027 mg/kg.

The data sets from Europe and the USA appeared to be from different populations and so were not combined. The 8 residue values from Europe, in rank order (median underlined), were: 0.03, 0.05, 0.13, 0.19, 0.33, 0.34, 0.51 and 0.61 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in pears of 1 and 0.26 mg/kg, respectively.

Stone fruits. In Italy, cyprodinil may be applied to apricots at 0.38 kg ai/ha and the fruit harvested 7 days after the final application. In trials in Greece and Italy, matching these conditions, residue levels in apricot flesh (Greece) and fruit (Italy) were 0.22 and 0.03 mg/kg respectively.

The USA maximum registered use on sour (tart) cherries is 0.53 kg ai/ha, with a PHI of 2 days and a maximum seasonal treatment of 1.1 kg ai/ha. USA trials with an application rate of 0.56 kg ai/ha (5 applications) and a PHI of 1 day did not exactly match the GAP but cyprodinil is a reasonably persistent residue, so 1-day data were considered adequate. The 5 applications were excessive, compared with the allowed seasonal maximum, but, in the light of the information available on carryover of cyprodinil residues, the Meeting agreed that the conditions of the residue trials were sufficiently close to GAP to allow evaluation of the data on residues in cherries. The same argument applied to the USA trials on peaches and plums. Residue levels in the cherries from the 11 trials were: 0.40, 0.46, 0.58, 0.68, 0.78, 0.98, 1.4, 1.5, 1.5, 1.7 and 1.7 mg/kg.

In Italy, cyprodinil may be applied to peaches at 0.38 kg ai/ha, with a 7 days PHI. Cyprodinil residues from 2 trials in Greece and 5 trials in Italy, meeting these conditions (0.30 kg ai/ha accepted, residues at 14 days higher than at 7 days in some cases), were: 0.12, 0.13, 0.14, 0.20, 0.37, 0.45 and 0.58 mg/kg. In a single trial on nectarines in Italy according to GAP the residue was 0.36 mg/kg.

French GAP allows an application rate of 0.19 kg ai/ha and a PHI of 14 days for cyprodinil use on peaches. In 2 trials, where the application rate was 0.23 kg ai/ha (sufficiently close to 0.19 kg ai/ha), the residues 14 days after treatment were 0.09 and 0.1 mg/kg.

The USA maximum registered use of cyprodinil on peaches is 0.53 kg ai/ha, with a PHI of 2 days and a maximum seasonal treatment of 1.1 kg ai/ha. USA trials, with an application rate of 0.56 kg ai/ha (5 applications) and a PHI of 1 day, were accepted as valid, as with cherries. Cyprodinil residues in the 13 acceptable trials were: 0.26, 0.59, 0.60, 0.67, 0.68, 0.80, 0.83, 0.88, 0.92, 1.0, 1.0, 1.2 and 1.3 mg/kg.

In France cyprodinil is registered for use on plums at 0.19 kg ai/ha with a 14 days PHI. Trials at 0.23 kg ai/ha were accepted as within maximum GAP. Residue levels in plums in 4 French trials matching GAP were 0.08 and 0.14 mg/kg in the pulp and 0.06 and 0.13 mg/kg in the whole fruit. The Meeting accepted that residue levels in the pulp were a reasonable approximation to residue levels in the whole fruit. The residue in plums from a Swiss trial matching French GAP was 0.14 mg/kg.

In Italy, cyprodinil may be applied to plums at 0.38 kg ai/ha, with a 7 days PHI. Cyprodinil residues from 2 trials in Italy, meeting these conditions, were: 0.12 and 0.13 mg/kg.

The USA maximum registered use for cyprodinil on plums is 0.53 kg ai/ha, with a PHI of 2 days and a maximum seasonal treatment of 1.2 kg ai/ha. USA trials, with an application rate of 0.56 kg ai/ha (5 applications) and a PHI of 1 day, were accepted as valid, as with cherries. Cyprodinil in the 9 acceptable trials were: 0.067, 0.080, 0.10, 0.19, 0.22, 0.43, 0.50, 0.54 and 0.65 mg/kg.

No relevant GAP was available for evaluation of the plum trials in Germany and the remaining trials from Switzerland.

The Meeting, while recognizing that the residues in plums generally appeared lower than those in cherries and peaches, agreed to pool the stone fruit data and estimate a group maximum residue level for stone fruits.

The combined European stone fruit data, in rank order (median underlined), were: 0.03, 0.06, 0.08, 0.09, 0.10, 0.12, 0.12, 0.13, 0.13, 0.14, 0.14, 0.14, 0.14, 0.20, 0.22, 0.36, 0.37, 0.45 and 0.58 mg/kg. The combined USA stone fruit data, in rank order (median underlined), were: 0.067, 0.08, 0.10, 0.19, 0.22, 0.26, 0.40, 0.43, 0.46, 0.5, 0.54, 0.58, 0.59, 0.6, 0.65, 0.67, 0.68, 0.68, 0.78, 0.8, 0.83, 0.88, 0.92, 0.98, 1.0, 1.0, 1.2, 1.3, 1.4, 1.5, 1.5, 1.7 and 1.7 mg/kg.

The two sets of data were apparently from different populations. The Meeting estimated a maximum residue level and an STMR of 2 and 0.68 mg/kg respectively for stone fruits, on the basis of the USA data.

Grapes. Cyprodinil may be used on grapes in Chile at 0.38 kg ai/ha, with harvest 2 days after the second application. The PHIs in the trials were 7 and 21 days, which were not sufficiently close to the recommended 2 days.

In France, cyprodinil may be used on grapes at 0.45 kg ai/ha, with harvest 50 days after a single application. The French trials, with application rates 0.38-0.50 kg ai/ha and PHIs of 42-89 days, were accepted as equivalent to maximum GAP. The decline study suggested that residues were quite persistent. Residues in grapes from these 16 trials were: 0.02, 0.05, 0.06, 0.12, 0.16, 0.17, 0.18, 0.18, 0.24, 0.29, 0.31, 0.33, 0.36, 0.37, 0.44 and 0.78 mg/kg.

In Italy, cyprodinil may be used on grapes at 0.30 kg ai/ha, with a 21 days PHI after the second application. In 3 trials in Italy, at 0.38 kg ai/ha and 21 or 28 days PHI, the residues were: 0.51, 0.64 and 0.75 mg/kg.

In Spain, cyprodinil may be used on grapes at 0.38 kg ai/ha, with a 21 days PHI after the second application. In 5 trials in Spain, matching GAP conditions, the residues were: 0.39, 0.54, 0.70, 1.1 and 2.1 mg/kg.

In Switzerland, cyprodinil may be used on grapes at 0.45 kg ai/ha in a single application. The label did not specify a PHI, so it was difficult to decide which trials complied with maximum GAP. No labels were available for GAP in South Africa or Germany.

In the USA, cyprodinil may be used on grapes at 0.53 kg ai/ha, with a 7 days PHI. No more than 1.1 kg ai/ha is permitted per crop. Residue data from the trials at 0.56 kg ai/ha, with a 7-day PHI but with 4 applications instead of the permitted 2, were accepted as relevant because the residue level would be mostly influenced by the last 2 applications. Cyprodinil residues in grapes from the 12 USA trials were: <0.02, 0.48, 0.52, 0.66, 0.82, 0.85, 0.94, 0.95, 0.96, 1.3, 1.4 and 1.8 mg/kg.

The residue data from USA, Italy and Spain appeared to be from similar populations and could be combined. Residues from the French trials (longer PHI) appeared to be substantially lower and constituted a different population. The data from the USA, Italy and Spain were combined for evaluation and the residues from 20 trials in rank order (median underlined) were: <0.02, 0.39, 0.48, 0.51, 0.52, 0.54, 0.64, 0.66, 0.7, 0.75, 0.82, 0.85, 0.94, 0.95, 0.96, 1.1, 1.3, 1.4, 1.8 and 2.1 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in grapes of 3 and 0.79 mg/kg, respectively.

Strawberries. In France, cyprodinil may be used on strawberries at 0.38 kg ai/ha, with harvest 3 days after a single application. Trials from France (8), Germany (3) and Italy (1) were accepted as matching GAP, because the application rate and PHI were correct, although the number of applications was 3 and in one trial was 4. Residues in strawberries from the 12 trials were: 0.10, 0.11, 0.18, 0.25, 0.27, 0.29, 0.30, 0.32, 0.33, 0.41, 0.43 and 1.2 mg/kg.

The Spanish maximum registered use for cyprodinil on strawberries is 0.38 kg ai/ha, with a PHI of 7 days. In 4 trials matching GAP, residues in strawberries were: 0.42, 0.75, 0.86 and 1.9 mg/kg.

Swiss registered use of cyprodinil on strawberries allows application at 0.45 kg ai/ha, with a 14 days PHI. Cyprodinil residues in 2 Swiss trials at 0.38 kg ai/ha (considered to match GAP) were: 0.12 and 0.24 mg/kg.

The USA trials, with an application rate of 0.56 kg ai/ha, could not be evaluated because the USA GAP allows only 0.38 kg ai/ha.

In summary, cyprodinil residues from the available 18 trials, in rank order (median underlined), were: 0.10, 0.11, 0.12, 0.18, 0.24, 0.25, 0.27, 0.29, 0.30, 0.32, 0.33, 0.41, 0.42, 0.43, 0.75, 0.86, 1.2 and 1.9 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in strawberries of 2 and 0.31 mg/kg, respectively.

Raspberries. Swiss registered uses for cyprodinil on raspberries allow application at 0.45 kg ai/ha, with a 14 days PHI. Cyprodinil residues in 4 German trials at 0.38 kg ai/ha and 13-14 days PHI, approximating Swiss GAP, produced residues of 0.23, 0.26, 0.26 and 0.38 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in raspberries of 0.5 and 0.26 mg/kg, respectively.

Onions. Supervised residue trials on onions were reported from France, Germany and Italy. Swiss GAP allows application at 0.38 kg ai/ha but no PHI is specified. The Meeting agreed that data on the bulbs harvested 0-7 days after the final treatment would be accepted as equivalent to GAP data. Cyprodinil residues in bulbs from 8 trials in rank order (median underlined) were: <0.02 (3), 0.05, 0.08, 0.09, 0.12 and 0.28 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in bulb onions of 0.3 and 0.065 mg/kg, respectively.

Cucumbers and summer squash. In Spain, cyprodinil may be applied at a spray concentration of 0.038 kg ai/hl, with harvest 7 days after the last of 3 applications. In 4 Spanish greenhouse trials matching GAP, residues in cucumbers were: 0.05, 0.07, 0.10 and 0.12 mg/kg.

The registered use in Italy allows cyprodinil application to cucumbers at 0.30 kg ai/ha and a PHI of 7 days. In a field trial in Greece and two field trials in Spain, with cyprodinil application at 0.38 kg ai/ha and 7 days PHI (valid for Italian GAP), residues were: <0.02, 0.04 and 0.10 mg/kg. In a greenhouse trial in Greece and two greenhouse trials in Switzerland (0.38 kg ai/ha, valid for Italian GAP), the residues were 0.05, 0.09 and 0.12 mg/kg.

In summary, residues from field uses were: <0.02, 0.04 and 0.10 mg/kg. Residues from greenhouse uses were: 0.05, 0.05, 0.07, 0.09, 0.10, 0.12 and 0.12 mg/kg. The Meeting agreed to combine the 10 trials for evaluation: <0.02, 0.04, 0.05, 0.05, 0.07, 0.09, 0.10, 0.10, 0.12 and 0.12 mg/kg.

The registered use in Italy for summer squash is the same as for cucumber. The Meeting agreed to extrapolate the cucumber values to summer squash.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in cucumbers and summer squash of 0.2 and 0.08 mg/kg, respectively.

Egg plants. The registered use in Italy allows cyprodinil application to egg plants at 0.30 kg ai/ha and a PHI of 7 days. In 2 Italian greenhouse trials on egg plants at 0.38 kg ai/ha and 7 days PHI, the residues were 0.02 and 0.08 mg/kg.

The registered use of cyprodinil in Spain allows a spray concentration of 0.038 kg ai/hl for egg plants, with a PHI of 7 days. The residues in 2 greenhouse crops with this use pattern in Spain were: 0.06 and 0.10 mg/kg.

In summary, the residues in egg plants were: 0.02, 0.06, 0.08 and 0.10 mg/kg.

The Meeting noted that egg plant is not a major crop and agreed to estimate a maximum residue level and an STMR value for cyprodinil in egg plant of 0.2 and 0.07 mg/kg, respectively, on the limited database.

Tomatoes. The registered use in Italy allows cyprodinil application to tomatoes at 0.30 kg ai/ha and a PHI of 7 days. Applications at 0.38 kg ai/ha were considered to be valid GAP. In greenhouse and tunnel trials conducted in Greece (2), Italy (3), Spain (2), Switzerland (1) and the UK (2), which were valid for Italian GAP, cyprodinil residues were: 0.31, 0.13, 0.12, 0.14, 0.08, 0.10, 0.12, 0.16, 0.11 and 0.08 mg/kg, respectively.

The registered use of cyprodinil in Spain allows a spray concentration of 0.038 kg ai/hl on tomatoes, with a PHI of 7 days. The residues in 2 covered crops with this use pattern in Spain were: 0.13 and 0.17 mg/kg.

In Switzerland, cyprodinil may be applied to tomatoes at 0.30 kg ai/ha, with harvest 3 days later. Residues in 2 glasshouse trials and one field trial in Switzerland, with an application rate of 0.38 kg ai/ha, were: 0.16, 0.25 and 0.15 mg/kg.

The Meeting agreed to combine the data from the 15 tomato trials which, in rank order (median underlined), were: 0.08, 0.08, 0.10, 0.11, 0.12, 0.12, 0.13, 0.13, 0.14, 0.15, 0.16, 0.16, 0.17, 0.25 and 0.31 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for cyprodinil in tomatoes of 0.5 and 0.13 mg/kg, respectively.

Sweet peppers. The registered use in Italy allows cyprodinil application to sweet peppers at 0.30 kg ai/ha and a PHI of 7 days. Applications at 0.38 kg ai/ha were considered to be valid GAP. In a field trial (F) in Italy, and in a field trial and greenhouse and tunnel trials from Spain matching Italian GAP, the residues were 0.02 (F), 0.05, 0.09 (F), 0.11 and 0.19 mg/kg.

The registered use of cyprodinil in Spain allows a spray concentration of 0.038 kg ai/hl for application to tomatoes, with a PHI of 7 days. The residues in 3 covered crops with this use pattern in Spain were: 0.12, 0.28 and 0.29 mg/kg.

The Meeting agreed to use the data from the covered crops for the evaluation, giving residues in rank order (median underlined): 0.05, 0.11, 0.12, 0.19, 0.28 and 0.29 mg/kg.

The Meeting, noting that residues in sweet peppers were very similar to those in tomatoes from the same use pattern, estimated a maximum residue level and an STMR value for cyprodinil in sweet peppers of 0.5 and 0.16 mg/kg, respectively.

Lettuce. Cyprodinil is registered in France for use on lettuce in the field or glasshouse at 0.19 kg ai/ha with harvest 14 days after the second application. In 7 supervised trials in France, with 3 applications of 0.23 kg ai/ha on lettuce in greenhouses and 14 days PHI, residues were: 1.1, 2.7, 2.8, 2.8, 2.9, 4.1 and 6.4 mg/kg.

In Italy, cyprodinil is registered for use on lettuce in the field or glasshouse at 0.26 kg ai/ha with harvest 14 days after the third application. In 3 supervised trials in greenhouses in Italy which matched GAP, cyprodinil residues in lettuce were: 1.3, 2.0 and 2.2 mg/kg. Two field trials in Italy which matched GAP produced residues of 0.06 and 0.18 mg/kg.

Cyprodinil may be used in Spain at 0.23 kg ai/ha, with harvest 14 days after the third application. In 3 field trials on cos lettuce, matching GAP, residues were <0.02, 1.0 and 1.1 mg/kg.

Lettuce trials from Germany and Switzerland could not be evaluated because there was no relevant label-supported GAP for German uses and the Swiss GAP did not specify a PHI.

The trials from Italy suggested that residues from glasshouse uses would be higher than from field uses and should be evaluated separately. The Meeting decided to use the greenhouse lettuce data to support the estimates.

In summary, cyprodinil residues in lettuce from 7 greenhouse trials in France and 3 trials in Italy, in rank order (median underlined), were: 1.1, 1.3, 2.0, 2.2, 2.7, 2.8, 2.8, 2.9, 4.1 and 6.4 mg/kg.

The Meeting noted that the 10 trials covered 9 varieties of lettuce and decided to make recommendations for both head and leaf lettuce. The Meeting estimated a maximum residue level and an STMR of 10 and 2.75 mg/kg, respectively, for cyprodinil in head and leaf lettuce.

Beans. Supervised residue trials of cyprodinil use on beans were evaluated against Austrian GAP for dwarf beans (0.38 kg ai/ha and 14 days PHI). Residues in pods from trials approximating this use pattern in 14 trials from France were: 0.07, 0.10, 0.10, 0.11, 0.11, 0.13, 0.14, 0.14, 0.15, 0.18, 0.19, 0.20, 0.26 and 0.29 mg/kg.

In Spain, cyprodinil may be sprayed on beans at a concentration of 0.038 kg ai/hl, with harvest 14 days after a third application. Residues in pods from 5 trials in Spain matching the required use pattern were: 0.09, 0.09, 0.11, 0.12 and 0.12 mg/kg.

In summary, the residues in beans from the 19 supervised trials in rank order (median underlined) were: 0.07, 0.09, 0.09, 0.10, 0.10, 0.11, 0.11, 0.11, 0.12, 0.12, 0.13, 0.14, 0.14, 0.15, 0.18, 0.19, 0.20, 0.26 and 0.29 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cyprodinil in beans in pods, except broad beans and soya beans, of 0.5 and 0.12 mg/kg, respectively.

Peas. No relevant GAP information was available from labels for the evaluation of the pea trials data.

Barley. Cyprodinil is registered in France for use on barley, as a foliar spray at 0.48 kg ai/ha, with timing specified by a growth stage instruction (use until end of earing). The instruction was interpreted as a PHI of approximately 35-50 days for the purpose of evaluating the trials. Trials from France and Germany were considered valid for French GAP, with application rates in the range of 0.36-0.61 kg ai/ha and with PHIs from 40-50 days. Cyprodinil residues in barley grain from 41 trials meeting these conditions, in rank order (median underlined), were: <0.02, 0.07, 0.09, 0.11, 0.13, 0.14, 0.18, 0.22, 0.24, 0.25, 0.28, 0.31, 0.32, 0.36, 0.36, 0.40, 0.44, 0.48, 0.54, 0.55, 0.58, 0.58, 0.65, 0.67, 0.73, 0.74, 0.74, 0.75, 0.76, 0.77, 0.93, 1.1, 1.2, 1.2, 1.3, 1.3, 1.4, 1.5, 1.8, 1.9 and 2.0 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cyprodinil in barley of 3 and 0.58 mg/kg, respectively.

Rye. No labels were available for uses of cyprodinil on rye, so the data could not be evaluated.

Wheat. Cyprodinil is registered in France for use on wheat, as a foliar spray at 0.60 kg ai/ha, with timing specified by a growth stage instruction (use until end of earing). The instruction was interpreted as a PHI of approximately 45-60 days for the purpose of evaluating the trials. Trials from France, Germany, Switzerland and the UK were considered valid for French GAP, with application rates in the range of 0.45-0.75 kg ai/ha and with PHIs of 42-61 days. Cyprodinil residues in wheat grain from 29 trials meeting these conditions, in rank order (median underlined), were: <0.02, <0.02, 0.02, 0.02, 0.03, 0.03, 0.03, 0.04, 0.05, 0.052, 0.06, 0.06, 0.06, 0.06, 0.07, 0.07, 0.07, 0.08, 0.08, 0.10, 0.10, 0.11, 0.11, 0.13, 0.13, 0.13, 0.14, 0.16 and 0.32 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cyprodinil in wheat of 0.5 and 0.07 mg/kg, respectively.

Almonds and almond hulls. In the USA, cyprodinil may be used on almonds in blossom at 0.53 kg ai/ha, with harvest 150 days later. Cyprodinil residues were below the LOQ in almonds (<0.02 mg/kg) and almond hulls (<0.05 mg/kg) in 5 trials in the USA which matched the GAP conditions.

The Meeting estimated maximum residue levels and STMRs for cyprodinil in almonds of 0.02* and 0.02 mg/kg, respectively, and in almond hulls of 0.05* and 0.05 mg/kg, respectively.

Cereal straw and fodder. The barley trials that were evaluated for grain residues were evaluated for residues in barley straw. Residues in barley straw determined in 29 of the trials, in rank order, were 0.15, 0.15, 0.17, 0.18, 0.20, 0.22, 0.24, 0.32, 0.33, 0.33, 0.34, 0.39, 0.39, 0.40, 0.41, 0.42, 0.42, 0.45, 0.46, 0.51, 0.55, 0.61, 0.67, 0.82, 0.84, 0.87, 1.1, 1.7 and 2.5 mg/kg.

Residues in wheat straw in 29 of the wheat trials in rank order were <0.05, 0.06, 0.06, 0.088, <0.10, 0.10, 0.13, 0.19, 0.19, 0.22, 0.26, 0.28, 0.31, 0.32, 0.32, 0.39, 0.50, 0.54, 0.58, 0.65, 0.71, 0.80, 0.95, 1.0, 1.1, 1.7, 2.3, 2.5 and 5.8 mg/kg.

The Meeting decided to combine the data from barley and wheat straw to recommend an MRL for straw and fodder of cereal grains. The residues in rank order (median underlined) were <0.05, 0.06, 0.06, 0.088, <0.10, 0.10, 0.13, 0.15, 0.15, 0.17, 0.18, 0.19, 0.19, 0.20, 0.22, 0.22, 0.24, 0.26, 0.28, 0.31, 0.32, 0.32, 0.32, 0.33, 0.33, 0.34, 0.39, 0.39, 0.39, 0.40, 0.41, 0.42, 0.42, 0.45, 0.46, 0.50, 0.51, 0.54, 0.55, 0.58, 0.61, 0.65, 0.67, 0.71, 0.80,0.82, 0.84, 0.87, 0.95, 1.0, 1.1, 1.1, 1.7, 1.7, 2.3, 2.5, 2.5 and 5.8 mg/kg.

The Meeting estimated a maximum residue level and an STMR for cyprodinil in straw and fodder (dry) of cereal grains of 10 and 0.395 mg/kg, respectively.

Processing

The meeting received information on the fate of cyprodinil residues during the brewing of beer, production of fruit juices, vinification, wheat milling and baking, drying of plums and grapes and the production of strawberry jam and tomato paste. Cyprodinil was shown to be hydrolytically stable under food processing conditions.

The processing factors (PF) in Table 54 were calculated from the trials data. The number of trials is shown in parentheses. The factors are the mean values excluding those where residues were undetectable except for beer. Cyprodinil residues were not detected in beer in 17 trials with LOQs of 0.01, 0.005 and 0.002 mg/kg. Estimated processing factors ranged from <0.002 to <0.17 and depended on the LOQ and the residue level in the barley. The value reported (<0.01) is a best estimate.

Table 54. Estimated processing factors for cyprodinil residues in various commodities.

Raw commodity	Processed product	PF	No
Apples	wet pomace	3.5	(7)
	juice	0.03	(2)
Barley	beer	<0.01	(17)
Grapes	juice	0.15	(22)
	wine	0.078	(46)
	raisins	2.1	(15)
Plums	dried prunes	1.7	(10)
Tomatoes	juice	0.17	(1)
	paste	0.86	(1)
Wheat	bran	3.0	(1)
	flour	0.27	(1)
	whole meal flour	0.92	(1)
	whole-grain bread	0.52	(1)

The Meeting used the processing factors to estimate MRLs and STMR-Ps for processed commodities.

The processing factor for raisins (2.1) was applied to the highest residue level in grapes (2.1 mg/kg), to calculate a residue of 4.4 mg/kg. The Meeting estimated a maximum residue level of 5 mg/kg for cyprodinil in dried grapes (currants, raisins and sultanas).

The processing factor for dried prunes (1.7) was applied to the highest residue level in stone fruit (1.7 mg/kg), to calculate a residue of 2.9 mg/kg. The Meeting estimated a maximum residue level of 5 mg/kg for cyprodinil in dried prunes.

The processing factor for wheat bran (3.0) was applied to the highest residue level in wheat (0.32 mg/kg), to calculate a residue of 0.96 mg/kg. The Meeting estimated a maximum residue level of 2 mg/kg for cyprodinil in wheat bran.

Processing factors were applied to the STMR values for the raw commodities, to estimate the following STMR-P values: apple wet pomace 0.07 mg/kg; apple juice 0.0006 mg/kg; beer 0.0058 mg/kg; grape juice 0.12 mg/kg; wine 0.062 mg/kg; dried grapes 1.7 mg/kg; apricot juice 0.3 mg/kg; dried prunes 1.2 mg/kg; tomato juice 0.022 mg/kg; tomato paste 0.12 mg/kg; wheat bran 0.21 mg/kg; wheat flour 0.019 mg/kg; wheat wholemeal flour 0.064 mg/kg; and wholemeal bread 0.036 mg/kg.

Farm animal dietary burden

The Meeting estimated the dietary burdens of cyprodinil for livestock from the residues in animal feeds resulting from its use.

Table 55. Farm animal maximum dietary burden estimates.

Commodity	Group	Residue mg/kg	Basis	% dry matter	Residue, on dry wt mg/kg	% of diet			Residue contribution, mg/kg		
						Beef cattle	Dairy cattle	Poultry	Beef cattle	Dairy cattle	Poultry
Almond hulls	AM	0.05	MRL	90	0.055						
Apple pomace, wet	AB	0.07	STMR-P	40	0.18	25			0.045		
Barley	GC	3	MRL	88	3.4	50	40	75	1.7	1.36	2.55
Straw and fodder of cereal grains	AS	10	MRL	88	11.4	25 [1/]	60 [1/]		2.85	6.84	
Wheat	GC	0.5	MRL	89	0.56						
Wheat bran	CM	0.21	STMR-P	88	0.24						
					Total	100	100	75			
						Maximum dietary burden			4.6	8.2	2.6

[1/] Barley hay.

Table 56. Farm animal STMR dietary burden estimates.

Commodity	Group	Residue mg/kg	Basis	% dry matter	Residue, on dry wt mg/kg	% of diet			Residue contribution, mg/kg		
						Beef cattle	Dairy cattle	Poultry	Beef cattle	Dairy cattle	Poultry
Almond hulls	AM	0.05	STMR	90	0.055						
Apple pomace, wet	AB	0.07	STMR-P	40	0.18	25			0.045		
Barley	GC	0.58	STMR	88	0.66	50	40	75	0.33	0.26	0.50
Straw and fodder of cereal grains	AS	0.395	STMR	88	0.45	25 [1/]	60 [1/]		0.11	0.27	
Wheat	GC	0.07	STMR	89	0.079						
Wheat bran	CM	0.21	STMR-P	88	0.24						
					Total	100	100	75			
						STMR dietary burden			0.48	0.53	0.50

[1/] Barley hay.

The calculated dietary burdens of cyprodinil, for estimation of MRLs and STMRs in animal commodities (residue levels in animal feeds expressed on dry weight) were: beef cattle 4.6 and 0.48 mg/kg, dairy cattle 8.2 and 0.53 mg/kg and poultry 2.6 and 0.50 mg/kg.

Farm animal feeding studies

A feeding study on lactating dairy cows was reported, which provided information on likely residues in animal tissues and milk resulting from residues in the animal diet.

Lactating Holstein cows were dosed daily, by gelatin capsule, with cyprodinil at the equivalent of 5, 15 and 50 ppm in the dry-weight diet for 28 consecutive days. Milk was collected throughout and, on days 28, 29 and 30, a cow from each dosing group was slaughtered for tissue collection. Cyprodinil residues were not detected (LOQ 0.01 mg/kg) in the milk (days 0, 1, 3, 7, 14 and 21), kidney or fat of cows from the highest dose group (50 ppm), nor in milk (day 26) or muscle from any dose groups. Cyprodinil was present in liver (highest residue 0.013 mg/kg) from the highest dose group but not from the other groups.

Maximum residue levels in animal commodities

The Meeting noted that no cyprodinil residues were detected (<0.01 mg/kg) in milk, kidney, fat and muscle from animals dosed for 28 days at 50 ppm cyprodinil, which was substantially above the maximum dietary burdens for beef and dairy cattle (4.6 and 8.2 mg/kg). Cyprodinil residues were detectable in liver, at 0.013 mg/kg, in the 50 ppm dosing group but not the 15 ppm dose group.

Maximum residue levels at the LOQs of suitable analytical methods were considered to be appropriate for the animal commodities. Residue levels in tissues (except liver) and milk were essentially zero. The level of cyprodinil residues in liver was also very low but was detected at a high dose. The data for liver and kidney were used to support a maximum residue level for edible offal.

The Meeting estimated maximum residue levels of 0.01* mg/kg for cyprodinil in meat (fat) from mammals, other than marine mammals, and for mammalian edible offal, and a maximum residue level of 0.0004*F mg/kg for milks (equivalent to 0.01* mg/kg in the milk fat).

The Meeting estimated STMRs of 0 mg/kg for cyprodinil in muscle and fat from mammals, other than marine mammals, and for milks, and 0.01 mg/kg for mammalian edible offal.

The Meeting noted that, in the metabolism studies on laying hens, cyprodinil itself was not detected in the poultry tissues (except in kidney at 0.001 mg/kg), even at the high feeding levels of 215 and 226 ppm. Cyprodinil was detected in eggs at 0.002-0.011 mg/kg from birds dosed at the high level. The feeding levels in the metabolism study were almost 100 times the maximum dietary burden (2.6 mg/kg), so the Meeting agreed that the expected level of cyprodinil residues in poultry tissues and eggs was essentially zero.

The Meeting estimated maximum residue levels of 0.01* mg/kg and STMRs of 0 mg/kg for cyprodinil in poultry meat (fat), edible offal of poultry, and eggs, and an STMR of 0 mg/kg for cyprodinil in poultry muscle.

RECOMMENDATIONS

On the basis of the data from supervised trials the Meeting concluded that the residue levels listed in Table 57 are suitable for establishing maximum residue limits and for IEDI assessment.

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

The residue is fat soluble. The residue definition applies to plant and animal commodities.

Table 57. Summary of recommendations.

Commodity		MRL, mg/kg	STMR or STMR-P, mg/kg
CCN	Name		
AM 0660	Almond hulls	0.05*	0.05
TN 0660	Almonds	0.02*	0.02
FP 0226	Apples	0.05	0.02
GC 0640	Barley	3	0.58
VP 0061	Beans, except broad bean and soya bean	0.5	0.12
VC 0424	Cucumber	0.2	0.08

Commodity		MRL, mg/kg	STMR or STMR-P, mg/kg
CCN	Name		
DF 0269	Dried grapes (= currants, raisins and sultanas)	5	1.7
MO 0095	Edible offal (mammalian)	0.01*	0.01
VO 0440	Egg plants	0.2	0.07
PE 0112	Eggs	0.01* note 1	0
FB 0269	Grapes	3	0.79
VL 0482	Lettuce, head	10	2.75
VL 0483	Lettuce, leaf	10	2.75
MM 0095	Meat (from mammals other than marine mammals)	0.01* (fat) note 1	0 (fat) 0 (muscle)
ML 0106	Milks	0.0004* F note 1, note 2	0
VA 0385	Onion, bulb	0.3	0.065
FP 0230	Pears	1	0.26
VO 0445	Peppers, sweet	0.5	0.16
PM 0110	Poultry meat	0.01* (fat) note 1	0 (fat) 0 (muscle)
PO 0111	Poultry, edible offal of	0.01* note 1	0
DF 0014	Prunes	5	1.2
FB 0272	Raspberries, red, black	0.5	0.26
FS 0012	Stone fruits	2	0.68
AS 0081	Straw and fodder (dry) of cereal grains	10	0.395
FB 0275	Strawberries	2	0.31
VC 0431	Squash, summer	0.2	0.08
VO 0448	Tomatoes	0.5	0.13
GC 0654	Wheat	0.5	0.07
CM 0654	Wheat bran, unprocessed	2	0.21
JF 0226	Apple juice		0.0006
	Apple pomace, wet		0.07
	Apricot juice		0.3
	Beer		0.0058
JF 0269	Grape juice		0.12
AB 0269	Grape pomace, dry		42
JF 0448	Tomato juice		0.022
	Tomato paste		0.12
CF 1211	Wheat flour		0.019
CF 1212	Wheat wholemeal		0.064
CP 1212	Wholemeal bread		0.036
	Wine		0.062

* At or about the LOQ.

Note 1: animal commodity, no residues expected from consumption of feed commodities with cyprodinil residues as evaluated by JMPR.

Note 2: for cyprodinil residues in milks the MRL is calculated as 4 % of the LOQ for milk fat (0.01 mg/kg). Milk fat is the fraction of the milk that is analyzed.

DIETARY RISK ASSESSMENT

Long-term intake

The International Estimated Daily Intakes (IEDIs) of cyprodinil, based on the STMRs estimated for all commodities, for the five GEMS/Food regional diets, were in the range 0-10 % of the ADI of 0.03 mg/kg bw (Table 58). The Meeting concluded that the long-term intake of residues of cyprodinil, resulting from its uses that have been considered by JMPR, is unlikely to present a public health concern.

Table 58. Assessment of risk from the long-term dietary intake of residues of cyprodinil (ADI = 0-0.03 mg/kg bw/day).

Code	Commodity	STMR or	Diets: g/person/day. Intake = daily intake: µg/person

			Mid-East		Far-East		African		Latin American		European	
			diet	intake	diet	intake	diet	intake	diet	intake	diet	intake
TN 0660	Almonds	0.02	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.8	0.0
FP 0226	Apple	0.02	7.5	0.2	4.7	0.1	0.3	0.0	5.5	0.1	40.0	0.8
JF 0226	Apple juice	0.0006	4.5	0.0	0	0.0	0	0.0	0.3	0.0	3.8	0.0
GC 0640	Barley (fresh)	0.48	1.0	0.5	3.5	1.7	1.8	0.9	6.5	3.1	19.8	9.5
VP 0061	Beans except broad bean & soya bean (green pods & immature seeds)	0.12	3.9	0.5	0.9	0.1	0.0	0.0	4.4	0.5	13.2	1.6
VC 0424	Cucumber	0.08	2.4	0.2	2.3	0.2	0.0	0.0	4.2	0.3	4.5	0.4
MO 0105	Edible offal (mammalian)	0.01	4.2	0.0	1.4	0.0	2.8	0.0	6.1	0.1	12.4	0.1
VO 0440	Egg plant	0.07	6.3	0.4	3.0	0.2	0.7	0.0	6.0	0.4	2.3	0.2
PE 0112	Eggs	0	14.6	0.0	13.1	0.0	3.7	0.0	11.9	0.0	37.6	0.0
FB 0269	Grapes (fresh, wine, excluding dried grapes)	0.79	15.8	12.5	1.0	0.8	0.0	0.0	1.3	1.0	13.8	10.9
DF 0269	Grapes, dried (= currants, raisins and sultanas)	1.7	0.3	0.5	0.0	0.0	0.0	0.0	0.3	0.5	2.3	3.9
VL 0482	Lettuce, head	2.75	2.3	6.3	0.0	0.0	0.0	0.0	5.8	16.0	22.5	61.9
VL 0483	Lettuce, leaf	2.75	2.3	6.3	0.0	0.0	0.0	0.0	5.8	16.0	22.5	61.9
MM 0095	Meat from mammals other than marine mammals: 20% as fat	0	7.4	0.0	6.6	0.0	4.8	0.0	9.4	0.0	31.1	0.0
MM 0095	Meat from mammals other than marine mammals: 80% as muscle	0	29.6	0.0	26.2	0.0	19.0	0.0	37.6	0.0	124.4	0.0
ML 0106	Milks	0	116.9	0.0	32.1	0.0	41.8	0.0	160.1	0.0	289.3	0.0
VA 0385	Onion, bulb	0.065	23.0	1.5	11.5	0.7	7.3	0.5	13.8	0.9	27.8	1.8
FP 0230	Pear	0.26	3.3	0.9	2.8	0.7	0.0	0.0	1.0	0.3	11.3	2.9
VO 0445	Peppers, sweet (incl. pim(i)ento)	0.16	3.3	0.5	2.0	0.3	5.3	0.8	2.3	0.4	10.3	1.6
PM 0110	Poultry meat: 10% as fat	0	3.1	0.0	1.3	0.0	0.6	0.0	2.5	0.0	5.3	0.0
PM 0110	Poultry meat: 90% as muscle	0	27.9	0.0	11.9	0.0	5.0	0.0	22.8	0.0	47.7	0.0
PO 0111	Poultry, edible offal of	0	0.1	0.0	0.1	0.0	0.1	0.0	0.4	0.0	0.4	0.0
DF 0014	Prunes	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.6
FB 0272	Raspberries, red, black	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1
VC 0431	Squash, summer	0.08	10.5	0.8	2.2	0.2	0.0	0.0	14.0	1.1	3.5	0.3
FS 0012	Stone fruits	0.68	7.3	5.0	1.0	0.7	0.0	0.0	0.8	0.5	23.3	15.8
FB 0275	Strawberry	0.31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	1.6
VO 0448	Tomato (fresh)	0.13	44.1	5.7	5.7	0.7	14.6	1.9	25.5	3.3	34.9	4.5
JF 0448	Tomato juice	0.022	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
-d	Tomato paste	0.12	5.8	0.7	0.2	0.0	0.3	0.0	0.0	0.0	4.0	0.5
GC 0654	Wheat	0.07	4.3	0.3	0.8	0.1	0	0	4.8	0.3	2.2	0.2
CM 0654	Wheat bran, unprocessed	0.21	-	-	-	-	-	-	-	-	-	-
CF 1211	Wheat flour	0.019	323.0	6.1	114.0	2.2	28.3	0.5	112.0	2.1	175.8	3.3
CF 1212	Wheat wholemeal	0.064	-	-	-	-	-	-	-	-	-	-
CP 1212	Wholemeal bread	0.036	107.7	3.9	38.0	1.4	9.4	0.3	74.7	2.7	58.6	2.1
-d	Wine only	0.062	0.5	0.0	0.0	0.0	0.8	0.0	19.8	1.2	97.8	6.1
	Total intake (µg/person)=			52.9		10.1		5.1		50.9		192.7
	Bodyweight per region (kg bw) =			60		55		60		60		60
	ADI (µg/person)=			1800		1650		1800		1800		1800
	%ADI=			2.9%		0.6%		0.3%		2.8%		10.7%
	Rounded %ADI=			3%		1%		0%		3%		10%

Short-term intake

The Meeting decided that an acute RfD is unnecessary and concluded that the short-term intake of cyprodinil residues is unlikely to present a public health concern.

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