

CYFLUTHRIN (157)**EXPLANATION**

Cyfluthrin was evaluated by the JMPR in 1986, 1987 and 1989. Maximum Residue Limits were established for a number of commodities, but all except one were temporary, as information from supervised trials had been too limited. At the 22nd Session of the CCPR (1990) and the 23rd Session (1991), there was some uncertainty about the residue limit for cattle milk, a question which is related to the limit of determination for residues of cyfluthrin in milk. The JMPR was asked for clarification.

The Meeting has received supplementary information on registered uses of cyfluthrin in many countries, and residue data from supervised trials on crops for which residue limits or temporary limits were proposed at earlier Meetings and for additional crops. New information was received about residues in animal products after pour-on treatments of cattle and sheep. New analytical methods for the determination of residues have been developed, and an updated list of national residue limits was available.

USE PATTERN

Information was provided on registered uses of cyfluthrin in many countries (Table 1).

Table 1. Registered uses of cyfluthrin

Crop	Country	Form.	Applications			PHI
			No.	Rate/appl. g ai/ha	Spray conc. g ai/hl	
Pome fruit	Argentina	EC	1-3	30-50	1-2	21
	Belgium	EC			1.5-2.5	7
	Denmark	EC		40		14
	Germany	EC	3-5	20-38	1.5-2.5	7
	France	EC	2-4	20	2	
	Italy	EW	1	50-80	3-4	3
	Japan	EW	2	is	3	14
	Portugal	EC	2	30	3	7
	South Africa	EC	4	10-20		14
	South Korea	EC	2-4	9		7
	Spain	EC	2-3	20-40	2.5-4	15
	Turkey	EC		40	3	14
	UK	EC	1-3	20-30		
Stone fruit	Belgium	EC			1.5-2.5	7
	Denmark	EC		40		14

Crop	Country	Form.	Applications			PHI
			No.	Rate/appl. g ai/ha	Spray cone. g ai/hl	
	Spain	L			2.5-4	15
Plum	Germany	EC	1-5	23-38	1.3-2.5	7
	Italy	EW	1	44	3.7	3
	UK	EC	2	25	12.5	28
Cherry	Germany	EC	3	23	1.5	7
	Italy	EW	1	44	3.7	3
Potato	Belgium	EW		15	3.8	7
	Italy	EW	1-2	29	3.7	3
	Portugal	EC	1-3		3.1	14
	Spain	L			2.5-4	3
Tomato	Australia	EC-UL	1-3	15-30		1
	Bolivia	EC	1-2	40-50		14
	Brazil	EC	3-5	20		4
	Ecuador	EC	2-3	20-30		14
	El Salvador	EC	1-3	40-60		8
	Guatamala	EC	1-4	40-50		14
	Honduras	EC	2	30-50		14
	Indonesia	EC	2-6	20-30		14
	Italy	EC	1-2	30-50	3-5	3
	Morocco	EC	4	50-60		14
	New Zealand	EC	2-4	25		3
	Peru	SL	2-3	30-50		14-21
	Philippines	EC	6	30		7
	Portugal	EC	4	30-40	3-4	2
	South Africa	EC	2	10-20		3
Spain	EC	4-5	50-60	2.5-4	3	
Sri Lanka	EC	1-2	30		14	
Tunisia	EC	3	20-30		7	
Turkey	EC	2	30		14	
Pepper	Italy	EW	3-4	22	3.7	3
	Spain	L			2.5-4	3
Paprika	Guatamala	EC	1-6	40-140		14

Crop	Country	Form.	Applications			PHI
			No.	Rate/appl. g ai/ha	Spray conc. g ai/hl	
	Israel	EC	1	30-50		14
	Italy	EC	1-2	30-50	3-5	3
	Spain	EC	3-4	40-50		3
Cucumber	Spain	L			2.5-4	3
Cauliflower	Germany	EC	3	15-25	2.5	7
Head cabbage	Germany	EC	3	15-25	2.5	7
	Italy	EW	1	22	3.7	3
Leafy brassica	UK	EC	2	13		7
Lettuce	Germany	EC	3	25	2.5	7
	Italy	EW	1	22	3.7	3
	Spain	L			2.5-4	3
Beans	Australia	EC		15-30		1
	Italy	EW	1	15	2.5	3
	UK	EC		13		42
Peas	Denmark	EC	1	15-20		14
	UK	EC	3	13		42
Rape	Belgium	EC		15		28
	Denmark	EC	1	10-30		28
	France	EC	1-2	10-20		
	Germany	EC	2	20		56
	Italy	EW	1	20-30		3
	UK	EC	1-2	10		
Sweet corn	New Zealand	EC	1-3	25		7
Sugar beet	Spain	L			2.5-4	15
Cotton	Australia	EC		30-40		28
	Spain	L			2.5-4	3
Cereal	Belgium	EC		15		
	Denmark	EC		15		42
	UK	EC		13		
Barley	Italy	EW	1	22	3.7	3
Maize	France	EC	1-2	40		
	Germany	EC	1	40		28

Crop	Country	Form.	Applications			PHI
			No.	Rate/appl. g ai/ha	Spray cone. g ai/hl	
	Guatamala	EC	1-3	40-50		14
	Honduras	EC	1-3	30-50		14
	Italy	EW	1	20-30		3
	Jordan	EC	1	30-40		14
	Malawi	EC	1	10		14
	Mexico	EC	1-2	25		
	Morocco	EC	1-2	25		1s
	New Zealand	EC	1-3	25		7
	Peru	EC	2	38		14
	South Africa	EC	1	10-20		14
	Spain	EC	1	25		3
	Tanzania	SL	2-3	30-40		
	Thailand	EC	1	20-30	5	14
	Turkey	EC	2	40		14
	Zimbabwe	EC	1	10		14
Sorghum	Australia	EC		10-15		14
Wheat	France	EC		is		
	Germany	ES	1	(seed dressing)	15 g/100 kg	
	Italy	EW	1	22	3.7	3
flops	Germany	EC	5	50-100		7
Cattle	Netherlands	EC		(dermal treatment)	100 mg/animal	14

RESIDUES RESULTING FROM SUPERVISED TRIALS

In addition to data received by the JMPR in 1986, 1989 and 1990, new data from supervised trials were available from Bayer AG on apples, plums, tomatoes, peppers, maize, rape seed, cotton seed and cattle milk, for which MRLs or TMRLs exist, and from trials on pears, berries, onions, cabbage, cauliflower, beans, peas, lupins, cereals other than maize, and animal products other than cattle milk, for which limits have not been proposed.

Crops with existing MRLs

Apple. Many trials on apples have been carried out in several countries. Most results supported the existing residue limit of 0.2 mg/kg but in a few cases residues were higher in conditions corresponding to good agricultural practice. The residue levels on apples were rather independent of the pre-

harvest intervals showing that differences in registered pre-harvest intervals are of little importance in relation to the residues found.

Residues of cyfluthrin in pears from trials in Italy, the UK and South Africa were of the same order as in apples, showing that a combined residue limit for pome fruit would be possible (Table 2).

Plum. Information on only two additional trials was supplied, both from the UK and at a rate a little lower than what is possible according to registered use. The residues were all at or below the limit of determination (Table 3)

Pepper. In four additional trials on peppers in Spain residues were all low and supported the existing temporary limit of 0.2 mg/kg (Table 4).

Tomato. Trials were carried out in Australia, Brazil, Italy and Spain. In some trials, especially those carried out in Australia, residues were higher than the existing temporary residue limit of 0.05 mg/kg (Table 4).

Cotton. Four trials were carried out in Australia. All residues in the seeds were below the limit of determination, supporting the existing temporary limit of 0.05 mg/kg (Table 5).

Rape, maize. Only a few additional trials were carried out. In three trials on rape in France residues in rape seed were below the limit of determination, supporting the existing temporary residue limit of 0.05 mg/kg. Residues in maize were also below the limit of determination in one trial from France and two from Spain, supporting the temporary limit of 0.05 mg/kg (Table 7).

Cattle milk. Several experiments were carried out in Australia with pour-on treatments of cattle. In two of the experiments residues in milk were determined, and in all samples residues were below the limit of determination (0.01 mg/kg) with doses from 200 to 800 mg per animal. Residues in milk from sheep treated with 2 mg/kg bw were also <0.01 mg/kg (Table 9).

NOTE: in Tables 2-8, residues from treatments (approximately) according to GAP are underlined.

Table 2. Residues of cyfluthrin in pome fruit from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days									Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	24-26	28-30	>30	
<u>Apple</u>													
France													
1984	4	24	1.5				0.06						5640/84
Germany													
1980	5	38	2.5	0.10	0.09	<u>0.08</u>		0.06	0.04				5600/80
	5	38	2.5	0.09	0.05	<u>0.04</u>		0.03	0.03				5601/80
	4	38	2.5	0.06	0.02	<u>0.05</u>		0.04	0.03				5603/80
1981	5	38	2.5	0.12	0.09	<u>0.08</u>		0.08	0.07				5601/81
	4	38	2.5	0.10	0.08	<u>0.08</u>		0.03	0.02				5603/81
1983	5	23	1.5	0.11	0.06	0.09	0.08	<0.01					5600/83
	5	23	1.5	0.04	0.01	0.06	<0.01	<0.01					5601/83
	5	is	1.5	0.04	0.05	0.05	0.05	0.03					5602/83

Crop Country Year	Application			Residues, mg/kg, after PHI, days									Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	24-26	28-30	>30	
	5	23	1.5	0.07	0.14	0.05	0.04	0.02					5603/83
	5	38	2.5	0.16	0.14	<u>0.10</u>	0.10	0.08					5634/83
	5	38	2.5	0.11	0.12	<u>0.12</u>	0.14	0.08					5635/83
	5	38	2.5	0.06	0.05	<u>0.05</u>	0.04	0.06					5636/83
	5	38	2.5	0.10	0.05	<u>0.09</u>	0.06	0.06					5637/83
1984	5	38	2.5	0.10	0.08	<u>0.08</u>	0.06	0.06					5656/84
	5	38	2.5	0.10	0.10	<u>0.10</u>	0.10	0.06					5657/84
1986	5	38	2.5	0.04	0.08	<u>0.05</u>	0.06	0.04					5670/86
	5	38	2.5	0.10	0.05	<u>0.06</u>	0.05	0.04					5672186
1987	5	45	3	0.07		0.05							5630/87
	5	45	3	0.13		0.08							563//87
1988	4	38	2.5	0.10	0.08	<u>0.06</u>	0.08						10251
	5	38	2.5	0.22	0.12	<u>0.16</u>	0.20						10252
	5	38	2.5	0.21	0.15	<u>0.18</u>	0.15						10253
	5	38	2.5	0.36	0.46	<u>0.42</u>	0.37						10254
	5	38	2.5	0.15	0.15	<u>0.18</u>	0.14						10255
	5	38	2.5	0.12	0.20	<u>0.15</u>	0.10						10256
	5	38	2.5	0.13	0.20	<u>0.14</u>	0.16						10257
	5	15-38	1-2.5	0.34	0.35	<u>0.29</u>	0.27						10258
Italy													
1981	5	50	2.5	0.17	<u>0.14</u>	0.18		0.10	0.15				5659/81
Japan													
1983	4	250	5			0.28		0.34	0.36				1026/84
	4	300	5			0.13		0.12	0.12				1027/84
South Africa													
1981	2	75	2.5	0.15		0.10		0.07	0.09		0.08	0.07	311/88- 166/U22
	2	75	2.5	0.10		0.08		0.06	0.05		0.05	<0.05	
	5	30-60	1-2	0.13			0.10		0.06	0.06		<0.05	
UK													
1984	5	15-25								0.01			9/84

Crop Country Year	Application			Residues, mg/kg, after PHI, days									Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	24-26	28-30	>30	
	4		0.8-1.3								0.01		10/84
	4		1.3								0.02		
1985	3	15										<0.05	20/85
	4		0.8-1.3									<0.05	21/85
Pear													
Italy													
1985	1	125	5					0.08	0.09				5644/85
	1	125	5					0.09	0.07				5645/85
	1	125	5						0.07				5646A/85
	1	125	5					0.14					5647B/85
South Africa													
1981	5	18	1	0.06		0.05		<u>0.05</u>		< 0.05	<0.05	<0.05	311/88- 166/U22
	3	23	1	0.11		0.07		<u><0.05</u>	0.05	<0.05		0.05	
1984	3		0.8-1.3			<u>0.04</u>							

Table 3. Residues of cyfluthrin in stone fruit and berries from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days					Report No.
	No.	g ai /ha	g ai /hl	0-1	3-4	5-7	12-14	>30	
<u>Plum</u>									
UK									
1985	3		0.8	< 0.05			0.05		33/85
	3		0.8				<0.05		34/85
<u>Strawbe</u>									
UK									
1985	1	12.5						<0.05	31/85
	1	12.5						< 0,05	32/85
<u>Black currant</u>									
UK									
1985	2		0.8	0.17	0.22	0.18			27/85

Crop Country Year	Application			Residues, mg/kg, after PHI, days					Report No.
	No.	g ai /ha	g ai /hl	0-1	3-4	5-7	12-14	>30	
			0.8	<0.05	< 0.05	<0.05			28/85
<u>Gooseberry</u>									
UK									
1985			0.8	<0.05	<0.05	<0.05			29/85
			0.8	<0.05	< 0.05	<0.05			30/15

Table 4. Residues of cyfluthrin in vegetables from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	28-30	>30	
<u>Onion</u>												
Australia												
1987	2	10	5					<0.02				74/87a
1988	2	25	12.5					< 0.02	< 0.02			74/87b
	3	10										4/89a
	3	25							<0.02			4/89b
	3	5							<0.02			5/89a
	3	12.5							< 0.02			5/89b
<u>Tomato</u>												
Australia												
1981	7	15	10	<0.03	<0.03	<0.03		<0.03				3/81a
	7	20	12	0.05	<0.03	<0.03		< 0.03				3/81b
	7	25	17	0.18	0.18	0.20		0.07				3/81c
1983	9	25	2.5		<0.03	<0.03	< 0.03	<0.03				2/83a
	9	30	3		<0.03	<0.03	<0.03	<0.03				2/83b
	9	60	6		0.03		<0.03	<0.03				2/83c
1985	8	3.8		0.28	0.12	0.10	0.04	0.05				65/85b
	8	7.5		0.42	0.22	0.20	0.08	0.07				65/85a
	8	4	4	0.18	0.06	0.09	0.02	0.02				64/85a
	8		8	0.26	0.15	0.16	0.06	0.04				64/85b
	8			0.04	0.02	0.01	0.01	0.01				64/85c

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	28-30	>30	
	8	60	60	0.03	0.03	0.02	0.01	0.01				65/85d
1986	9	15	11	<u>0.03</u>		0.03	<0.01	<0.01				61/86a
	9	30	23	<u>0.12</u>		0.06	0.04	<0.01				61/86b
	1	0.11 g /5 m row		0.27	0.29	0.14	0.07	0.05				31/86a
	1	0.22 g /5 m row		0.24	0.49	0.51	0.19	0.14				31/86b
Brazil												
1987	20	25	2.5	0.10	<u>0.02</u>	0.01						5678/87
	20	50	5	0.05	0.02							5679/87
1989	11	25	2.5	0.02	<u><0.01</u>							38926-
		50	5.0	0.03	<0.01							38926/89
Italy												
1981	3	38	2.5	0.11	<u>0.06</u>	0.03						5649/81
	3	38	2.5	0.02	<u>0.01</u>	<0.01						5655/81
Spain												
1981	3	25	2.5	0.05	0.02	0.01						5651/81
	3	25	2.5	0.06	0.03	0.01						5652/81
1988	2	30	2.8			<0.02						0074/88
1990	1	25	2.5	<0.02		<0.02						709/90
	1	25	2.5	<0.02		<0.02						710/90
Pepper (paprika)												
Spain												
1988	2	30	2-2.5			<u>0.09</u>						0085/88
1989	1	25	2.5	<0.02		<u><0.02</u>						0004/89
	1	25	2.5	<0.02		<u><0.02</u>						0005/89
Cauliflower												
Australia												
1986	12	16-40	4	0.14	0.08	0.15						21/86a
	12	32-80	8	0.32	0.13	0.07						21/86b

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0-1	3-4	5-7	9-11	12-14	20-21	28-30	>30	
	12	30	3	0.34	0.11	0.13	<0.01	0.16				20/86a
	12	60	6	0.47	0.28	0.35	0.09	0.02				20/86b
	12	16-40	4	0.24	0.05	0.06	0.04	<0.01				20/86c
	12	32-80	8	0.65	0.18	0.35	0.09	0.03				20/86d
1987	10	32-48	4	0.02	0.04	0.05	<0.01	<0.01				25/87a
	10	64-96	8	0.07	0.02	0.01	<0.01	<0.01				25/87b
	10	16-24	2	0.07	0.02	0.02	0.01	<0.01				26/87a
	10	32-48	4	0.05	0.04	0.05	0.01	<0.01				26/87b
<u>Cabbage</u>												
Australia												
1986	9	15	1.5	0.08	0.02	0.06	0.03	0.05				45/86a
	9	30	3	0.12	0.03	0.10	0.03	0.03				45/86b
	9	16-24	2	0.07	0.02	0.02	0.03	0.04				45/86c
	9	32-48	4	0.27	0.04	0.11	0.02	<0.01				45/86d
	12	30	3	0.07	0.26	0.15	0.11	0.02				23/86a
	12	60	6	0.15	0.16	0.15	0.05	0.02				23/86b
	12	16-40	4	0.20	0.16	0.17	0.03	0.06				23/86c
	12	32-80	8	0.31	0.24	0.16	0.05	0.07				23/86d
	12	16-40	4	0.18	0.25	0.09						24/86a
	12	32-80	8	0.33	0.36	0.20						24/86b
1987	10	32-48	4	0.03	<0.01	0.07	<0.01	<0.01				27/87a
	10	64-96	8	0.09	<0.01	0.18	<0.01	<0.01				27/87b
<u>Bean</u>												
(Broad bean)												
UK												
1985	1	12.5								Beans	<0.05	26/85
(Common bean)												
Australia												
1982	3	20	4	<u>0.09</u>	0.07	0.03						17/82a
	3	40	8	0.17	0.11	0.08						17/82b
1984	4	30	5.4	<u>0.32</u>	0.29	0.17	0.12	0.10				32/84a

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0	3-4	5-7	9-11	12-14	20-21	28-30	>30	
	4	60 g	10.8	0.32	0.23	0.18	0.11	0.11				32/84b
	4	30	5.4	<u>0.14</u>	0.16	0.13	0.10	0.12				33/84a
	4	60 g	10.8	0.32	0.28	0.27	0.18	0.11				33/84b
<u>Peas</u>												
UK												
1985	3	12.5					Seed	<0.05				24/85
							Pod	<0.05				
	3	12,5					Seed	<0.05				25/85

Table 5. Residues of cyfluthrin in chick pea, lupin and cotton seed from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days							Report No.	
	No.	g ai /ha	g ai /hl		14-15		23-25	27-28	38	>100		
<u>Chick pea</u>												
Australia												
1987	1	20	20	Seed	0.50							71/87a
				Straw	0.36							
	1	40	40	Seed	0.99							71/87b
				Straw	0.53							
	1	10	10	Seed	0.22							72/87a
				Straw	0.20							
	1	20	20	Seed	0.32							72/87b
				Straw	0.35							
<u>Cotton seed</u>												
Australia												
1984	3	40	35							<0.02		23/84a
	3	80	70							<0.02		23/84b
1985	2	40						<0.01				5/85a
	2	80						<0.01				5/85b
<u>Lupin</u>												
Australia												

Crop Country Year	Application			Residues, mg/kg, after PHI, days							Report No.
	No.	g ai /ha	g ai /hl		14-15		23-25	27-28	38	>100	
1983	1	20	10				<0.01				46/83a
	1	40	20				<0.01				46/83b
1985	1	20	17						<0.01		8/86a
	1	40							0.01		8/86b
	1	80	61						0.02		8/86c
1987	1	10	10		<0.005						85/87a
	1	20	20		< 0.005						85/87b
	1	10	7			Grain	0.02				11 /87a
						Straw	0.11				
	1	20	14			Grain	0.02				11/87b
						Straw	0.14				
	1	20	20		<0.01						84/87a
	1	40	40		<0.01						84/87b
	1	140					<0.01				69/87a
	1	280					<0.01				69/87b

Table 6. Residues of cyfluthrin in barley and wheat from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0-1	3	5	6-7	13	20		37	
Barley												
Australia												
1985	1	20	40	Grain					0.22			46/85b
				Straw			0.8	1.1	2.7			
	1	16	32	Grain					0.17			46/85a
				Straw			0.5	1.2	1.2			
	1	40	80	Grain					0.51			46/85c
				Straw			2.3	1.2	5.0			
Barley, green matte												
Australia												
1988	1	10	3	0.21	0.38	0.36	0.26					69/88a

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl	0-1	3	5	6-7	13	20		37	
	2	10	3	0.56	0.25	0.18	0.16			Grain	<0.02	69/88b
										Straw	0.48	
	1	20	7	0.93	0.45	0.43	0.32					69/88c
	2	20	7	1.0	0.67	0.66	0.72			Grain	0.05	69/88d
										Straw	0.66	
	1	5	2	0.11	0.07	0.07	0.07					69/88e
	1	10	3	0.33	0.35	0.20	0.29					70/88a
	2	10	3	0.56	0.21	0.45	0.42			Grain	0.04	70/88b
										Straw	0.37	
	1	20	7	0.81	0.46	0.52	0.48			Grain	0.02	70/88c
										Straw	0.05	
	2	20	7	1.3	0.92	0.95	1.1			Grain	0.06	70/88d
										Straw	0.79	
<u>Wheat.</u> <u>green matter</u>												
Australia												
1988	1	10	3	0.84	0.38	0.19	0.23					67/88a
	1	20	7	1.4	0.70	0.54	0.32					67/88b
	1	10	3	0.86	0.41	0.18	0.21					68/ 88a
	1	20	7		0.68	0.50	0.49					68/88b

Table 7. Residues of cyfluthrin in rape from supervised trials

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl		0	3	15	35	45	73	>90	
<u>Rape</u>												
France												
1990	1	10	2	Seed							<0.01	0658/90
				Pod	0.27							
	1	10	2	Seed							<0.01	0659/90
				Pod	<0.01							
	1	10	2	Seed				<0.01				

Crop Country Year	Application			Residues, mg/kg, after PHI, days								Report No.
	No.	g ai /ha	g ai /hl		0	3	15	35	45	73	≥90	
				Pod	<0.01							
<u>Maize</u>												
France												
1990	1	40	8	Green forage	0.89							
				Whole plant					0.08			0661/90
				Grain						<0.04		
Spain												
1985	3	25	3	Grain		<0.04						5637/85
	1	25	2.5	Grain			<0.04					6802/85

Table 8. Residues of cyfluthrin in sorghum from supervised trials in Australia

Year	Application			Residues, mg/kg, after PHI, days							Report No.	
	No.	g ai /ha		1-2	3-4	6-8	10	13-15	19	24-27		
1983	1	35	Grain	0.09								15/83a
	1	70	Grain	0.20								
	1	35	Grain			0.16						15/83b
	1	70	Grain			0.34						
	1	35	Grain						0.17			15/83c
	1	70	Grain						0.32			
	1	35	Grain							0.15		15/83d
	1	70	Grain							0.31		
1984	4	15	Grain	0.64		0.59	0.59	0.59				15/84a
	4	30	Grain	1.0		1.3	1.3	1.3				15/84b
	1	40	Grain	0.7	0.6	0.6						14/84a
	1	80	Grain	0.7	0.6	0.6						14/84b
1987	2	20	Grain			0.57		0.30		0.08		59/87a
			Foliage			0.24		0.10		0.09		
	2	40	Grain			1.3		0.83		<0.02		59/87b
			Foliage			0.45		0.25		<0.02		

Product	Application Mg/animal	Residues, mg/kg, after application						Report No.
					0.02			
Cattle fat		1 day	3 days	7 days	10 days	14 days	21 days	014/86
	200	0.01	0.03	0.08	0.05	0.04	0.05	
		<0.01	0.01	0.04	0.05	0.07	0.04	
		<0.01	0.04	0.03	0.06	0.05	0.04	
Muscle Liver Kidney	200	All residues 10 days after appl.: <0.01						
Cattle milk			9 hours		24 hours		48 hours	071/85
	200		<0.03(3)		<0.01(3)		<0.01(3)	
	400		<0.01(3)		<0.01(3)		<0.01(3)	
Cattle milk			3 days		5 days		10 days	041/87
	400		<0.01(3)		<0.01(3)		<0.01(3)	
	800		0.01-		0.01(3)		<0.01(3)	
			<0.01(2)					
Sheep fat				10 days		35 days		BH44/86
	200			<0.05		<0.05		
				<0.05		<0.05		
				0.02		<0.05		
Sheep fat			1 day		5 days		14 days	062/86
	100		<0.01(3)		<0.01(3)		<0.01(3)	
	200		<0.01(3)		0.03-		<0.01(3)	
					<0.01(2)			
Muscle Liver Kidney	100 and 200	All residues: <0.01 mg/kg						
Sheep fat			12 hours	14 hours	24 hours	48 hours	72 hours	110/86
	2 mg/kg bw		<0.01(3)	<0.01(3)	<0.01(3)	<0.01(3)	<0.01(3)	
Muscle Liver Kidney	2 mg/kg bw	All residues: <0.01						
Sheep milk			8 hours	18 hours		24 hours		073/86
	2 mg/kg b.w.	<0.01(3)		<0.01(3)		<0.01(3)		

Additional crops

Berries. A few trials have been carried out in the UK on strawberries, black currants and gooseberries, but no information was available on registered uses of cyfluthrin on berries (Table 3).

Onion. A number of trials were carried out on onions in Australia but with no information on registered uses in Australia or other countries. Residues from all trials were below the limit of determination (0.02 mg/kg) (Table 4).

Cauliflower, cabbage. Several trials were carried out in Australia on cauliflower and cabbage, but information on registered uses on cauliflower was received only from Germany and on cabbage from Germany and Italy. Initial residues were up to 0.5 mg/kg and normally decreased to low levels one to two weeks after treatment (Table 4).

Beans and peas. Trials on beans were carried out in Australia, and one trial on beans and two on peas in the UK. Residues in beans from Australia one day after the last application, which is the pre-harvest interval in Australia, were from 0.09 to 0.32 mg/kg, but the dosage corresponded to GAP in Australia in only a few trials. Residues in peas and beans from the UK trials were <0.05 mg/kg (Table 4).

Chick pea, lupin. In Australia several trials were carried out on chick peas, where residues in seeds were up to 1 mg/kg and in straw up to 0.5 mg/kg. In lupins residues were generally very low (Table 5).

Barley, wheat. In trials in Australia on barley, residues were determined in grain, straw and green forage. Residues on grain, depending on the dosage and pre-harvest interval, were from <0.02 to 0.51 mg/kg. In green forage residues were generally 0.5-1 mg/kg. In trials on wheat residues were determined in green forage only, and the levels were of the same order as in green barley forage (Table 6).

Sorghum . Many trials were carried out in Australia. Some residues in grain were <0.02 mg/kg but most were at the level of 0.3-0.6 mg/kg. The doses used in most trials were considerably higher than the registered uses in Australia (Table 8).

Cattle meat, sheep meat. Experiments were carried out in Australia with pouron treatments of cattle and sheep. In all experiments a solution of cyfluthrin was sprayed or poured on the animals along the back line from shoulder to the mid-lumbar region or was poured on one spot between the shoulder blades. Dosages used were 200, 400 or 800 mg per animal, but in one treatment of a sheep the dosage was only 100 mg. No information was available to the Meeting on the registered use in Australia or in any other countries except The Netherlands, where the registered use is 100 mg per animal.

Residues were detectable only in the fat from cattle and sheep. at levels from <0.001 to 0.12 mg/kg. The initial residues were low but increased. In one experiment, where samples were taken at short intervals, residues were at a maximum approximately 10 days after application and then decreased. Residues were not detectable in any samples of meat, liver or kidney (Table 9).

METHODS OF RESIDUE ANALYSIS

A new analytical method has been developed for the determination of cyfluthrin residues in plant materials, beer and sugar using gas chromatography with an electron-capture detector (1). The method is an improvement of an earlier published method (2). In the new method cyfluthrin is extracted from the sample with acetone, acetone-water, acetonitrile or dichloromethane depending on the crop analysed. Liquid-liquid partitioning is used for pre-purification of the extracts, and further clean-up is by column chromatography on silica gel, Florisil and/or C18 cartridges. The final determination is by gas

chromatography with an EC detector. The limit of determination ranges from 0.01 to 1.0 mg/kg depending on the material analysed.

Information was also available on a minor modification of the method (3), and on a modification which makes it possible to analyse residues in cereals (grain, straw and green material). The limit of determination in this modification was from 0.02 to 0.05 mg/kg depending on the crop.

An analytical method published by Deutsche Forschungsgemeinschaft in "Manual of Pesticide Residue Analysis Vol. 1," on the determination of organochlorine, organophosphorus, nitrogen-containing and other pesticides (Method No. S19) (5) also includes the determination of cyfluthrin after a modification to the column chromatography (6). The modified method was tested by determination of cyfluthrin in rape (pods and seeds). The limit of determination was 0.01 mg/kg.

NATIONAL MAXIMUM RESIDUE LIMITS

The Meeting has received information on the following national MRLs.

Country	Crop/Commodity	MRL (mg/kg)
Argentina	Apples	0.5
	Cauliflower	0.1
	Cotton seed	1
	Cotton oil	2
	Flax	0.7
	Peas	0.1
	Soya beans	0.05
	Soya oil	0.1
	Sunflower seed	0.05
	Sunflower oil	0.1
	heat	0.1
Australia	Beans	0.5
	Cabbage	0.5
	Cereals	2
	Cereals, bran	5
	Cotton seed	0.01
	Legume vegetables	0.5
	Pulses	0.5
	Tomatoes	0.2

Country	Crop/Commodity	MRL (mg/kg)
Australia cont.	Cattle fat	0.2
	Cattle meat	0.01
	Pig fat	0.01
	Pig meat	0.01
	Poultry meat	0.01
	Sheep fat	0.05
	Sheep meat	0.01
	Milk	0.01
Austria	Fruits	0.05
	Vegetables	0.05
Belgium	Pome fruits	0.3
	Stone fruits	0.3
	Vegetables	0.3
	Other plant commodities	0.05
Brazil	Coffee	0.01
	Cotton	0.01
	Rice	0.01
	Soya beans	0.01
	Tomatoes	0.02
	Wheat	0.01
France	Fruits	0.5
	Vegetables (except cabbage)	0.5
	Cabbage	0.01
Germany	Cabbage, Red	0.5
	Cabbage, Savoy	0.5
	Cabbage, White	0.5
	Cauliflower	0.1
	Cherries	0.5
	Hops	20
	Lettuce, Head	0.5

Country	Crop/Commodity	MRL (mg/kg)
Germany cont.	Oilseeds	0.05
	Plums	0.5
	Pome fruit	0.5
	Tomatoes	0.1
	other plant commodities	0.05
Israel	Cotton seed	0.05
	Cucumbers	0.5
	onions, bulb	1
	Other food	0.05
Italy	Apples	0.5
	Barley	0.5
	Beans	0.5
	Cabbage	0.5
	Cherries	0.5
	Corn	0.5
	Cotton seed	0.5
	Cucumber	0.5
	Grapes	0.5
	Leek	0.5
	Lettuce, Head	1
	Peaches	0.5
	Pears	0.5
	Peas	0.5
	Peppers	0.5
	Prunes	0.5
	Potatoes	0.5
	Rape seed	0.5
	Strawberries	0.5
	Sugar beets	0.5
	Tomatoes	0.5

Country	Crop/Commodity	MRL (mg/kg)
Italy cont.	Wheat	0.5
Japan	Fruits (except exocarp of summer oranges)	1
	Exocarp of summer oranges	5
	Potatoes	0.1
	Pulses	0.1
	Sugar beets	0.5
	Tea	20
	Vegetables	2
Mexico	Apples	0.01
	Cotton	1
	Nuts	0.05
	Potatoes	0.05
	Sorghum	1
	.Soya beans	0.05
	Tobacco	0.0
Mozambique	Beans	0.2
	Cotton	0.05
	Corn	0.2
	Sorghum	0.5
	Soya beans	0.2
Netherlands	General	0.05/
New Zealand	Brassicae	0.5/
Peru	Potatoes	0.1
	Tomatoes	2
Portugal	Potatoes	0.05/
South Africa	Alfalfa	0.5
	Apples	0.1
	Apples, for export	0.01
	Beans	0.2
	Corn, forage	0.1

Country	Crop/Commodity	MRL (mg/kg)
South Africa cont.	Cotton seed	0.05
	Cruciferae	0.2
	Grapes	0.1
	Grapes, for export	0.05
	Lupins	0.5
	Pears	0.1
	Pears, for export	0.05
	Peas	0.1
	Sorghum	0.2
	Tomatoes	0.2
	heat	0.1
Spain	Alfalfa	2
	Fruiting vegetables	0.2
	Lettuce	0.5
	Pome fruit	0.2
	Stone fruit	0.2
	Other plant commodities	0.02
Switzerland	Foods incl. milk	0.05
USA	Cotton seed	1
	Cotton seed, hulls	2
	Cotton seed, oil	2
	Hops, fresh	4
	Hops, dried	20
	Tomato Pomace (dry)	5(T)
	Tomato Pomace (wet)	2(T)
	Tomato Products (concentrated)	0.5(T)

APPRAISAL

Cyfluthrin was evaluated in 1986, 1987, 1989 and 1990. The Meeting received additional information on registered uses of cyfluthrin and on residues in food. Reports were received of many supervised trials on crops and commodities for which MRLs or TMRLs are established (apples, plums, tomatoes, peppers, maize, rape seed, cotton seed and cattle milk) and also on pears, berries,

onions, cabbage, cauliflower, beans, peas, lupins, cereals other than maize, and animal products other than cattle milk. Additional information was also received on new analytical methods developed for determination in plant materials.

The new results on peppers, maize, rape seed, cotton seed and cattle milk were limited but in agreement with data evaluated at earlier Meetings, and enabled the Meeting to recommend a change from temporary to full MRLs. Residues in some trials on apples and tomatoes were considerably higher than the existing temporary limits, and the Meeting proposes to increase these limits.

In reply to the request of the CCPR to clarify the limit proposed for cattle milk at an earlier meeting, it was stated that the limit of 0.1 mg/kg proposed at the 1989 JMPR was either a misprint or possibly was based on residues in milk fat. According to the explanation in the text of the 1989 monograph the correct figure is 0.01 mg/kg, which also is confirmed by new data from experiments on cattle in Australia received at the present Meeting.

The 1989 proposal was based on trials with pour-on treatments of cattle with cyfluthrin and was also confirmed by animal feeding studies reported to the JMPR in 1986, where residues in milk from cattle which had been fed for 28 days with a dietary level of cyfluthrin as high as 5 ppm were 0.01-0.02 mg/kg.

Residues in the fat from these cattle were 0.21-0.30 mg/kg, but as the dose level was higher than would be expected in practice no residue limit was proposed for cyfluthrin in fat.

The data received from trials on plums were too scanty and from trials which were not in accord with registered uses. Residues from trials on maize forage were also too limited to confirm the existing temporary limit. The Meeting therefore recommends withdrawal of the temporary limits for plums and maize forage. New trials on maize forage are in progress and results may be expected to be available for the 1994 JMPR. These new data, together with those submitted in 1989 and to the present Meeting may allow the 1994 Meeting to propose a new residue limit for maize forage.

The data from trials on berries, onions, cabbage, cauliflower, beans, peas, barley, wheat, sorghum and meat from cattle and sheep were too limited and/or not in accordance with registered uses, and the Meeting was unable to propose residue limits for these commodities.

Information was received on a new analytical method developed to determine residues of cyfluthrin in plant material, beer and sugar, and a modification of it to determine also residues in cereal grains. The method is an improvement of an earlier one published by the Deutsche Forschungsgemeinschaft in the Manual of Pesticide Residue Analysis, slightly modified to determine residues of cyfluthrin in plant material.

RECOMMENDATIONS

On the basis of the data on residues resulting from supervised trials the Meeting concluded that the residue levels listed below are suitable for use as MRLs.

Definition of the residue: cyfluthrin (fat-soluble)

Commodity		Recommended MRL (mg/kg)		PHI on which based, days
		New	Previous	
CCN	Name			
FP	0226 Apple	0.5	0.2	7
FS	0014 Plums (including Prunes)	W	0.2 T	
VO	0445 Peppers, Sweet	0.2	0.2 T	7
VO	0448 Tomato	0.5	0.05 T	3
GC	0645 Maize	0.05	0.05 T	
SO	0691 Cotton seed	0.05	0.05 T	28
SO	0495 Rape seed	0.05	0.05 T	30
ML	0812 Cattle milk	0.01 F V	0.01 F T V	
AF	0645 Maize forage	W	0.5 T	

FURTHER WORK OR INFORMATIONDesirable

1. Supplementary residue data from trials on berries, onions, cabbages, cauliflower, beans, peas, barley, wheat and sorghum.
2. Data on residues in meat from feeding studies with residues in the feed at the 1 mg/kg level, which may occur in practice.