DDT (021)

EXPLANATION

DDT was first evaluated by the JMPR in 1966 and has been reviewed several time since. At the 22nd Session of the CCPR (1991) it was agreed that countries should be requested for information about current registered uses of DDT and about actual residue levels based on uses or monitoring data. This request was repeated by the 23rd Session of the CCPR (1992). At this Session it was also decided to withdraw the general TMRL of 1 mg/kg for DDT in fruits and vegetables, and countries were invited to provide data to enable the JMPR to develop ERLs for DDT in commodities within these groups.

The Meeting has not received any information about uses of DDT. Monitoring data were received from Canada, Denmark, Finland, The Netherlands and the USA.

USE PATTERN

No information was supplied to the Meeting on registered or recommended uses of DDT on crops or animals.

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

Data from monitoring for residues of DDT in plant crops and animal products were received from the governments of Canada, Denmark, The Netherlands and the USA.

The presentation of the data received differed from country to country, and the layouts in the Tables are consequently different.

With a few exceptions all the residues in the Tables are expressed as the sum of *p,p′*-DDT, *o,p′*-DDT, *p,p′*-DDE and *p,p′*-TDE (*p,p′*-DDD), in conformity with the Codex definition.

Table 1. Residues of DDT from monitoring of fruits and vegetables in Canada, 1984-1989.

Commodity		No. of samples	No. of samples with residues[1]	DDT, mg/kg in positive samples	
				Range	Mean
Domestic fruits and vegetables	Blueberries	11	0		
	Carrots	94	11	0.01-0.11	0.04
		1	1		0.26
	Grapes	86	5	0.01-0.03	0.02
	Maize	99	0		
	Pears	100	0		

Commodity		No. of samples	No. of samples with residues[1]	DDT, mg/kg in positive samples	
				Range	Mean
	Potatoes	7	1		0.05
Imported fruits and vegetables	Bananas	100	0		
	Carrots	4	2	0.39, 0.48	0.43
	Celery	18	0		
	Cucumbers	9	1		0.02
	Grapes	99	2	0.03, 0.03	0.03
	Grapefruit	15	0		
	Lemons	5	0		
	Lettuce	100	0		
	Melons	105	0		
	Oranges	30	0		
	Pears	112	5	0.04-0.12	0.08
	Peppers, green	13	0		
	Pineapples	15	0		
	Potatoes	16	2	0.01, 0.07	0.04

[1]Limit of determination 0.01 mg/kg.

Table 2. Residues of DDT from monitoring of animal products in Canada, 1984-1989.

Commodity		No. of samples	No. of samples with residues[1]	DDT, mg/kg in positive samples	
				Range	Mean
Domestic products	Butter	40	4	0.02-0.1	
	Cheese	17	5	0.01-0.06	0.03
	Milk	88	0		
	Eggs	10	0		
	Cattle meat (fat)	12	0		
	Chicken meat (fat)	5	2	0.01, 0.01	0.01
	Pig meat (fat)	42	2	0.10, 0.17	0.14
Imported products	Cheese	124	6	0.01-0.11	0.04

[1]Limit of determination 0.01 mg/kg.

Monitoring of fruits and vegetables in Denmark, 1986-1991. Residues of DDT in the period 1986-1991 were monitored in 1,959 samples of domestic and 2,349 samples of imported fruits and vegetables. During 1986-1989 the limit of determination and reporting was 0.02 mg/kg. In 1990-1991 a reporting limit of 0.10 mg/kg was used. No residues of DDT or its metabolites were present in the crops at these reporting limits.

Table 3. Residues of DDT from monitoring of animal products in Denmark, 1986-1991.

Commodity		No. of samples	No. of samples with residues[1]	DDT, mg/kg in positive samples	
				Range	Mean
Domestic	Butter	989	6	0.02-0.03	0.02
	Cheese	252	3	0.02-0.05	0.03
	Eggs	1073	3	0.02-0.03	0.02
	Cattle meat (fat)	715	27	0.02-0.09	0.04
	Pig meat (fat)	598	40	0.02-0.10	0.04

Commodity		No. of samples	No. of samples with residues[1]	DDT, mg/kg in positive samples	
				Range	Mean
		1	1		0.31
	Poultry meat (fat)	150	5	0.02-0.03	0.03
Imported products	Butter	6	2	0.03-0.03	0.03
	Cheese	222	10	0.02-0.04	0.04
	Eggs	75	0		

[1]Limit of determination 0.02 mg/kg

From Finland the Meeting was supplied with the information that in 1990 residues of *p,p'*-DDE were found in 5 samples of imported eels at levels of 0.03-0.18 mg/kg and in one sample of imported carrots at 0.01 mg/kg.

In The Netherlands agricultural plant products are routinely analyzed for residues of DDT. In the period 1987-1991 about 37,500 samples of fruit, vegetables and cereal grains were analyzed. Residues of DDT, with the limit of determination of 0.01 mg/kg, were present in 54 samples of which 6 were apples. One sample of apples contained 0.5 mg/kg: the MRL in The Netherlands is 0.1 mg/kg.

Table 4. Residues of DDT from monitoring of domestic animal products in The Netherlands, 1990-1992.

Commodity[1]	No. of samples	No. of samples with residues[1]	Limit of determ., mg/kg	DDT, mg/kg in positive samples, range
Veal calf	180	1	0.10	0.11-0.50
Dairy cow	144	2	0.10	0.11-0.50
Broiler	143	0	0.10	
Fattened bull	143	0	0.10	
Pig	324	3	0.10	0.11-0.50
Sheep	72	18	0.01-0.10	0.01-0.05
	1	1		0.11-0.20
Goat	48	5	0.01-0.10	0.01-0.05
Horse	37	9	0.01-0.10	0.01-0.10
Egg powder	24	2	0.01-0.10	0.11-0.20

[1]All residues expressed on fat basis.

From the USA information was supplied on residues of DDT from monitoring carried out in 1991 and 1992. Residue data were received for fruit and vegetables as a whole group, except for residues in citrus fruit, pineapples, carrots, sugar beets and tomatoes. Data were also available for residues in crude soya bean oil and in animal products.

Table 5. Residues of DDT from monitoring of fruit, vegetables and cereal grains in the USA, 1991-1992.

Commodity	No. of samples	No. of samples with residues[1]	90th percentile mg/kg	DDT, mg/kg max.
Domestic				
Carrots	227	32	1991: 0.05	0.17
			1992: 0	
Citrus fruit	408	0		
Pineapples	37	0		
Sugar beet	36	1		0.01
Tomatoes	227	0		
Other fruits and vegetables	6132	235	0	0.30
Soyal bean oil (crude)	8	0		
Whole grain	573	5	0	0.09
Imported				
Carrots	126	16	1991: 0.03	0.13
			1992: 0	
Citrus fruit	302	0		
Pineapples	143	0		
Tomatoes	717	1		0.03
Other fruits and vegetables	6459	26		0.05

[1]Limit of determination 0.01 mg/kg.

Table 6. Residues of DDT from monitoring in the USA of domestic produced milk and eggs, 1991-1992.

Commodity	No. of samples	No. of samples with residues[1]	90th percentile mg/kg	DDT, mg/kg max.
Milk (fat)	748	29	<0.01	0.19
Eggs	621	0		

[1]Limit of determination 0.01 mg/kg.

Table 7. Residues of DDT from monitoring in the USA of imported meat products, 1991-1992.

Commodity[1] (meat)	Year	No. of samples	No. of samples with residues[2]	DDT, mg/kg max.
Cattle	1991	1864	5	0.40
	1992	2070	41	1.8

Commodity[1] (meat)	Year	No. of samples	No. of samples with residues[2]	DDT, mg/kg max.
				2 samples >1.0 5 samples <1.0 and >0.5 3 samples <0.5 and >0.25
Pig	1991	1122	1	0.27
	1992	1059	5	0.19
Sheep, lamb and goat	1991	424	4	1.1
	1992	314	8 (sheep)	0.44
Poultry	1991	59	0	
	1992	14	0	

[1]All residues expressed on fat basis
[2]Limit of determination 0.01 mg/kg.

APPRAISAL

At the 22nd and 23rd Sessions of the CCPR (1991 and 1992) it was agreed that countries should be requested to provide information on registered or recommended uses of DDT and also on residue levels from trials with registered uses or from monitoring. At the 23rd Session the existing Extraneous Residue Limits for DDT in cereal grains, eggs, meat and milk were converted to temporary limits, and the general MRL for DDT in fruits and vegetables was withdrawn. Residue data were necessary to support the existing ERLs and possibly to develop ERLs for DDT in commodities in the fruits and vegetables groups.

The Meeting has received no information about registered or recommended uses of DDT on crops or animals. Monitoring data for residues of DDT in fruits, vegetables, cereal grains and products of animal origin were received from the governments of Canada, Denmark, The Netherlands and the USA.

It was obvious from the monitoring data that residues are not often present in fruit, vegetables and cereal grains, but the incidence observed is of course dependent on the limit of determination used in the monitoring. In Canada, The Netherlands and the USA the limit of determination was 0.01 mg/kg, while the limit in Denmark was 0.02 mg/kg. In Canada DDT was present in 29 of 1100 samples. In Denmark no residues were found in any of 4300 samples. In The Netherlands DDT was present in 54 of 37,500 samples, and in the USA in 369 of 15,445 samples. In most cases residues were low and mostly below 0.1 mg/kg. The frequency of residues in fruit and vegetables seems to be highest in carrots, probably owing to the occurrence of DDT in the soil from earlier uses and the ability of carrots to take up pesticides from the surrounding soil. In Canada and the USA DDT was present in 64 of a total of 452 samples of carrots, which is approximately 14%. It is more surprising that DDT residues were also present in several samples of apples.

Residue data from monitoring cereal grains were available only from the USA. In 579 samples of cereal grains DDT was present in 5 samples with the highest residue at 0.09 mg/kg.

Residue data were available from many samples of animal products such as butter, milk, cheese, eggs and the fat of cattle, pigs, poultry, sheep, goats and horses. Residues of DDT and its metabolites occurred more frequently in animal products than plant products. Residues were mostly at very low levels, but in some samples up to 0.5 mg/kg and in a few samples even higher with a maximum of 1.8 mg/ kg in fat from cattle.

Residues in the monitoring data available to the Meeting were usually

considerably lower than the existing temporary ERLs. Residues in the fat of meat were as mentioned above much lower than the existing limit of 5 mg/kg. In eggs residues with a few exceptions were below the limit of determination (0.01 or 0.02 mg/kg), and were at the level of 0.11 and 0.20 mg/kg in only two samples of egg powder. For milk the existing TMRL is 0.05 mg/kg, approximately 1 mg/kg in milk fat. All residues in samples from the monitoring studies were considerably lower, and generally below the limit of determination. Residues in butter and cheese, calculated as the levels in milk fat, were always considerably lower than 1 mg/kg.

The incidence of detection of environmental contaminants is expected to increase if lower limits of determination are employed. The Meeting noted the remarks made at the 24th Session of the CCPR (ALINORM 93/24, 29) concerning realistic limits of determination, that using methods with low limits of determination was costly and not the best use of resources. The Meeting concluded that for the general monitoring of DDT and the metabolites included in the definition, a suitable limit of determination for the total residue would be 0.02 mg/kg.

As the production of the compound ceases and environmental residues decrease, extraneous residues in food will also decrease. The Meeting therefore recommended that monitoring data should be evaluated again in 1998, with the possibility of lowering the ERLs for DDT.

RECOMMENDATIONS

On the basis of the residue data received from monitoring in four countries the Meeting concluded that the residue levels listed below are suitable for establishing ERLs.

Definition of the residue: Sum of *p,p′*-DDT, *o,p′*-DDT, *p,p′*-DDE and *p,p′*-TDE (*p,p′*-DDD) (fat-soluble).

Commodity		Recommended MRL (mg/kg)	
CNN	Name	New	previous
VR 0577	Carrots	0.5 E	
PE 0112	Eggs	0.1 E	0.5 E T
MM 0095	Meat	1 (fat) E	5 (fat) E T
ML 0106	Milks	0.02 F E	0.05 F E T

FURTHER WORK OR INFORMATION

Desirable

Residue data from monitoring DDT in fruit and vegetables in other countries.