METHOMYL (094)

EXPLANATION

Methomyl was reviewed by the 1975-1978 and 1986-1990 Meetings at which numerous maximum residue levels were estimated or revised. Among these were a 2 mg/kg proposal for pome fruit, 5 mg/kg for grapes and 5 mg/kg for cabbage, all of which have been somewhat controversial at the CCPR. Additional information was requested from (or promised by) governments and the 1990 JMPR asked for data under development on grapes to be submitted. The proposals for pome fruit and cabbages were advanced to Step 8 by the 1990 CCPR and that for grapes to Step 8 by the 1991 CCPR.

The Meeting received additional information on grapes (including processing), pears and cabbage, and information on GAP for a number of commodities.

Table 1. USA label uses for methomyl on selected crops

	Application			Interval last application to harvest (days)
Commodity	Formula-tion ype	Rate kg ai/ha (% ai)	Interval between (days)[1]	
Apple	WSL[2] or WSP	0.5-2 (0.0135-0.054)	5-12	8
Cabbage	WSL or WSP	0.25-1	5-7	1
Grapes raisins	WSL or WSP	0.13-1	5-14	1 table & 14 wine grapes
Pears (N.E. only)	WSL or WSP	2 (0.054)	1 appl.	7

[1]Water-soluble liquid methomyl formulation containing 24% active ingredient, EPA Reg. No. 352-370 or 29%, EPA Reg. No. 352-384; or 90Z water-soluble powder, EPA Reg. No. 352-342.

[2]Generally as needed, but only 3 applications at the high rate.

Table 2. Summary of Canadian methomyl uses

Commodity	Application		PHI (days)	Notes
	Formulation /products	Rate Kg ai/ha		
Barley, oats, wheat	SN[1] WP[2]	0.27-0.48 (0.24-0.49)	20	Grnd. or air at 5-7 day intervals or as needed
Flax, rape/ canola	SN WP	0.19-0.27 (0.2-0.24, flax) (0.19-0.46, rape)	8	Grnd. or air at 5-7 day intervals
Cucumbers (greenhouse)	SN	4.7 g ai/1001	3	3 appl. high vol. spray at 5-7 days interval (closed glasshouse)
Broccoli, Brussels sprouts, cauliflower, cabbage	SN WP	0.27-0.48 (0.24-0.49)	7 (except cabbage) 1 (cabbage)	Grnd. appl. 5-7 day intervals or as needed; 1-3 at high rate, then at lower
Brussels sprouts, strawberries	SN	0.71	30 (B. sprouts) 14 (strawberries)	One grnd. spray for slugs, late evening
Beans (snap)	SN	0.5	7	Grnd. appl. at 3-7 day intervals or as needed
Peas	SN WP	0.49 (0.46)	1	See beans
Lettuce (field), potatoes, tomatoes	SN WP	0.48-0.97 (0.46~0.9)	7 (lettuce) 3 (potatoes) 1 (tomatoes)	Grnd. appl. at 5-7 day intervals or as needed; 1-3 at high rate
Sweet corn	SN, WP	0.39-0.56	3	Up to 4 grnd. appl. at 2-5 day intervals on to silk or whorls
Apples	SN	0.54-1.9 (0.49-1.9)	8	Grnd. appl. at 5-7 day intervals or as needed. 10 day grazing restriction in orchards

[1]SN - Product DUQ 11725, Lannate L Insecticide, 215 g/l
[2]WP - Product DUQ 10868, Lannate SP Insecticide, 90%. Rates in parentheses

USE PATTERN

Current information on GAP in the USA including specimen labels (for watersoluble powder and water-soluble liquid LV) were provided for a number of crops, as well as summary information that GAP in Tunisia involved 150 g Lannate 25/hl and a 2-week PHI for 'culture maraiclese'. Details were not provided. Recommendations in the USA for the commodities under consideration are summarized in Table 1 and Canadian recommendations for methomyl use on several commodities in Table 2.

RESIDUES RESULTING FROM SUPERVISED TRIALS

Summarized data on supervised field trials on grapes and pears in the United States and on cabbage in Hungary are given in Table 3.

Grapes. A 1 mg/kg GL estimated by the 1975 JMPR WAS based on a 7-day PHI and residues up to 0.94 mg/kg after 3-7 days. This was increased to 5 mg/kg by the 1976 JMPR on the basis of a 2-day PHI, new GAP (1 kg ai/ha) and residues in trials up to 4.8 mg/kg under GAP conditions. The 1988 JMPR confirmed this on the basis of residues up to 6.7 mg/kg at 1 day and 4.4 mg/kg at 7 days from applications according to GAP.

Doubts continue to be expressed at the CCPR on the need for a 5 mg/kg limit, and there has been concern about possible residues in wine. An important influence on the residue level is the PHI, which varies from country to country and between table and wine grapes. Although national authorities regulate uses according to whether the grapes are wine or table grapes, single national MRLs (and Codex MRLs) are set to accommodate both uses (see 1989 JMPR Report, Section 3.3). This recognizes the difficulty of distinguishing between table and wine grapes since some varieties may be used for both purposes. See Fate of Residues below for information on grape processed products.

New trials on grapes reflecting GAP were conducted at 13 sites in 5 states in the USA on wine grapes, table grapes and varieties which are used for both purposes. Samples were taken at 1, 7, 10 and 14 days after 5 treatments at GAP rates or exaggerated rates. Plots varied in size (e.g. 7-30 vines) and a number of methods of application were used (airblast, $C0^2$ backpack, boom spray). Major grape-growing areas of the USA were represented. Samples were stored under frozen conditions (temperature not specified) for the $\leq$ 12.5 months from sampling to extraction for analysis by HPLC (see 'Methods of residue analysis').

The data were in the form of fairly detailed summaries and are given in Table 2, where treatments representing GAP (1 kg ai/ha, PHI 1 day for table grapes and 14 days for wine grapes) are identified. In response to an inquiry about the raw data, the manufacturer stated that 'the values shown in the report are the raw analytical results'.

Average residues (with ranges in parentheses) from treatments at GAP rates were 2.1 mg/kg (0.54-5.6) at one day; 1.4 mg/kg (0.21-4.5) at 7 days; 1.2 mg/kg (0.12-4.5) at 10 days and 1.1 mg/kg (0.12-3.9) at 14 days. Apparent residues in controls were generally less than the 0.02 mg/kg limit of quantification (10 X noise level) except those for one site where contamination was suspected. Analytical recoveries were 94 $\pm$ 9% at 0.02-10 mg/kg fortification levels, but a little higher at 0.02 mg/kg (85-115%, mean 106%).

Limited additional data reflecting GAP rates (400 g ai/ha, lower than in the above trials) were also provided (Brodsky, 1991). They were from 1990 supervised trials conducted in France in connection with processing studies (see 'Fate of Residues') and are summarized in Table 3. None of the results were at the French 7-day PHI for grapes, but at 1, 28 and 34 days. The 28-and 34- day intervals were referred to as *normal practice' for grapes grown for wine in France. The l-day samples were included to demonstrate the effects of processing on grapes containing measurable residues, although a 1 day PHI is GAP for table grapes in some other countries. No residues (<0.05 mg/kg) were found in grapes after 28 or 34 days. They were up to 0.13 mg/kg after 1 day.

Table 3. Methomyl residues in selected crops from supervised trials

Country Crop Variety/State (year)	Application Formu- lation	Rate kg ai/ha	No.	Interv. betwn. (days)	Residues (mg/kg) at interval (days) after last application 1	7	10	14	Ref.
USA									
Grapes									
Catawba[1]/NY	WSL	1	5	7-14	3.5[3]	2.8	2.1	2	A
(1989)		1 + 2 [2]	5	7-14	5.8	4.4	2.3	2.9	
		1	5	7-14	3.8	2.5	2	2	
		1 + 2	5	7-14	3.6	4.3	3.2	3.3	
Concord[1]/MI	WSL	1	5	7-14	2.9	2.8	1.6	2.1	
(1989)									
/WA		1	5	7-14	2.2	1.1	1.4	1.4	
(1989)		1 + 2	5	7-14	11[4]	6.8[4]	4.2 [4]	5.7 [4]	
Riesling[5]/OR	WSL	1	5	7-14	0.58	0.43	0.48	0.17	
(1989)		1 + 2	5	7-14	1.2	0.42	0.96	0.28	
Chardonnay[5]/	WSL	1	5	7-14	4.1	1.2	0.95	0.95	
CA (1989)		1 + 2	5	7-14	1.9	2.4	2.4	2.5	
CA	WSL	1	5	7-14	5.2 [4]	4.5	4.5	3.9*	
(1989)		1 + 2	5	7-14	18	8.6	12	9.1*	
Cabernet[5]/CA		1	5	7-14	1.3	0.84	0.74	0.4*	
(1989)		1 + 2	5	7-14	3.6	1.9	1.9	0.87*	
Thompson[1]/CA	WSL	1	5	7-14	0.78	0.41	0.34	0.34	
(1989)		1 + 2	5	7-14	1.9	1.6	0.95	1.4	
Flame [6] /CA	WSL	1	5	7-14	0.93	0.5	0.37	0.16	
(1989)		1 + 2	5	7-14	1	0.5	0.3	0.15	

Table 3. Methomyl residues in selected crops from supervised trials (contd.)

Country Crop Variety/State (year)	Formu- lation	Application Rate kg ai/ha	No.	Interv. betwn. (days)	Residues (mg/kg) at interval (days) after last application 1	7	10	14	Ref.
USA									
Grapes									
Thompson/CA	WSL	1	5	7-14	0.54	0.21	0.12	.0.40	A
(1989)		1 + 2	5	7-14	1.6	0.64	0.67	0.39	
		1	5	7-14	1	0.53	0.52	0.28	
		1	5	7-14	1	0.32	0.19	0.12	
					Grape controls ≤ 0.023 mg/kg for most sites and Varieties, except for Cabernet variety at 0.029 to 0.18 mg/kg (av. 0.09 mg/kg)[7] and one Chardonnay control at 0.042 mg/kg.				
Pears									
Bartlett/NY	WSL	2	1	--		0.28			B
(1989)		2	1	--		0.28	Pear controls <0.02 mg/kg		
Hungary									
					7	15	31		
Cabbages	L	0.2	1	--	0.5	0.18	<0.08		C
Head					0.3	0.14	<0.08		
					0.3	0.14	<0.08		
							<0.08		
							<0.08		
							<0.08		
							<0.08		

Notes to Table on next page

Notes to Table 3

*15 day PHI

1Table and wine grape in USA

2First 3 appli. at 1 kg ai/ha (1X GAP)
And last 2 at 2 kg ai/ha (2X GAP.)

3 Residues reflecting GAP underlined

4 Average of multiple analyses

5 Wine grape in USA

6 Table grape in USA

7 Contamination of controls suspected

References

A Kennedy, 1990

B Hays, 1990

C Soos, 1990

See 'Methods of residue analysis' for a discussion of the analytical method used. The dates of analyses were not provided, but the interval from harvesting to completion of the study was <9 months and the samples were well stored. Residues in stored analytical samples of grapes are reported to be stable for at least one year (see 'Fate of residues - Stability of pesticide residues in stored analytical samples', below).

Pears. A guideline level of 2 mg/kg was estimated for apples by the 1975 JMPR on the basis of a 7-day PHI and residues up to 1.96 mg/kg after 8-10 days. It was converted to a TMRL after the allocation of a TADI in 1986, and replaced by an estimate at the same level for pome fruit in 1988. Although residues in pears from treatments at 1/14 of the maximum GAP rate were 0.34-3.4 mg/kg (the next highest 2.07 mg/kg), the Meeting confirmed the 2 mg/kg estimate since only the one value significantly exceeded it.

Although the proposal for pome fruit was advanced to Step 8 of the Codex procedure at the 1990 Session, some delegations preferred a higher and others a lower limit.

Limited additional. data (in summary only) from supervised trials on pears at two sites in the USA were provided. Plots of 4 trees were treated by hydraulic sprayer with a foliar broadcast application of 400 gal/A at the GAP rate of 2 kg/ha.

Mature fruit were harvested 7 days after treatment and stored frozen until analysis one year later by HPLC. Although storage stability studies on pome fruit were not available, the Meeting was informed that they had started. Such studies on other commodities reportedly show that methomyl residues are stable for a year under frozen conditions.

Residues were 0.28 mg/kg in both trials and untreated controls <0.02 mg/kg. Analytical recoveries averaged approximately 95 % (85-105 %) at levels of 0.02 to 4 mg/kg. Sample chromatograms suggest that a limit of determination of 0.02 mg/kg can be attained for pears.

The Meeting was informed that additional trials are planned for both apples and pears.

Cabbage. A 5 mg/kg guideline level estimated by the 1975 JMPR was based on a 1-day PHI and residues at 0-1 day up to 3 and 16 mg/kg from multiple applications at 0.5 kg/ha and 1 kg/ha respectively. Applications up to 1 kg/ha were GAP, as was a 1-day PHI. Residues were ≤ 1.1 mg/kg after 2-3 days.

At the 1988 CCPR some delegations questioned whether the 1975 estimate still reflected current GAP and others indicated that in many cases it did. At the request of the CCPR the 1988 JMPR re-examined a number of the limits, including that for cabbage, in the context of current GAP and confirmed the 5 mg/kg limit for cabbage. Information on GAP reviewed by the 1989 JMPR shows that the basis for the 1975 estimate still accords with GAP.

At the 1990 CCPR some delegations still supported a limit of 1 or 2 mg/kg as opposed to 5 mg/kg, noting that the latter would be required only at short PHIs. The CCPR noted that GAP included a PHI of 1 day in at least one country and that some national MRLs were 5 mg/kg, and advanced the 5 mg/kg proposal to Step 8.

Limited summary information on 1980 cabbage trials (presumably reflecting national GAP) were submitted from Hungary to demonstrate that a 1-2 mg/kg limit is sufficient. Residues in head cabbage were $\leq$0.5 mg/kg 7 days after a single application of a liquid methomyl formulation at 0.2 kg/ha, $\leq$ 0.18 mg/kg after 15 days and <0.08 mg/kg after 31 days (Table 2) (Soos, 1990). No further details were provided.

FATE OF RESIDUES

In storage and processing

Grapes. Grapes treated at GAP rates were harvested after 1 day to yield measurable residues in order to study the effects of processing into wine and its fractions, and after 28 and 34 days, which is the normal PHI for wine grapes in France where the general grape PHI is 7 days (Brodsky, 1991). No data were provided on the grape pomace.

No residues were found above the limits of determination (0.05 mg/kg for grapes; 0.02 mg/kg for wine, must and lees) in the 28- or 34-day samples. In one trial (higher volume spray, Cabernet Sauvignon variety) methomyl residues after 1 day of 0.11-0.13 mg/kg in the grapes gave no residues in the wine, must or lees. In the other (lower volume spray, Semillon variety) residues of 0.08 mg/kg in grapes resulted in 0.11 mg/kg in the crude must, 0.09 mg/kg in decanted must and $\leq$0.05 mg/kg in wine, final wine (ready to bottle) and lees (all values averages of replicate analyses of raw samples or duplicate analyses of the same extract). See 'Methods of residue analysis' for a discussion of the analytical method used.

Stability of pesticide residues in stored analytical samples

The meeting was informed that the freezer storage stability of methomyl residues on grapes (for two years) and pears was being studied. The reports are not yet available, but residues on grapes are reported to be stable after 12 months storage at -20 $\pm$ 5°C.

Residues in the edible portion of food commodities

Grapes. The fate of methomyl residues during processing into wine is discussed above. Residues in ready-to-bottle wine were about half those found in one variety of grapes and were not detectable in the wine from another. This

suggests that residues near the current 5 mg/kg limit, which have been found occasionally in wine grapes at GAP PHIs (e.g. 14 days), might give rise to residues in wine of the order of 1 to 2 mg/kg. Residues in 'decanted must, were at about the same level as in one variety of grapes. No information was provided on possible residues in 'ready-to-bottle' grape juice.

Table 4. Residues of methomyl in grapes, wine and wine processed fractions from 1990 supervised trials in France (Brodsky, 1991).

Location		Application			Residues, mg/kg, at interval, days, after last application	
		Rate		No.		
Commodity	Sample	g ai/ha	l/ha			
					1	34
Avignon					0.11-0.13[1]	<0. 05[1]
Grapes	12/13**	400	1200	2 in 34-day trial		
Wine3	15/163			3 in I-day trial	<0.02[2]	<0.02[2]
	91-2/91-3[4]				<0.02[2]	<0.02[2]
Lees3	18/19[3]				<0.02[2]	<0.02[2]
	91-5/91-6[5]				<0.02[2]	Sample lost
	91-8/91-9[6]				<0.02[2]	<0.02[2]
					1	28
Castres						
Grapes	1/2	400	400	3 (at 28 days)	0.07, 0.1	<0.05[1]
				4(at 1 day)	0.06, 0.08[1]	
Crude must	2/3				0.13, 0.12[2]	0.02[2]
						0.08[9]
Decanted must	5/6				0.1, 0.06	<0.02[7]
					0.09, 0.09[1]	
Wine	5/6[5]				0.05, 0.04[2]	<0.02[2]
	11/12[6]				0.03, 0.04[2]	<0.02[2]
						0.03[9]
'Final Wine'	14/15[8]				0.03, 0.04[2]	<0.02[2]
						0.02[9]
Lees	2/3[5]				0.05, 0.04[2]	<0.02[2]
	8/9[6]				0.05, 0.04[2]	<0.02[2]
					0.03[9]	

Notes

* Variety: Cabernet Sauvignon
** Sample no. for 28 or 34/or 1 day samples
*** Variety: Semillon
1 Replicate analyses (including extraction), each with two different GLC conditions
2 As determined with two different GLC conditions
3 Sampling at racking
4 Sampling at 2nd drawing off (clear wine)
5 Sampling an 1st drawing off
6 Sampling at 2nd drawing off
7 Duplicate analyses (including extraction), one of which was analyzed by two different GC conditions.
8 Ready to bottle
9 Replicate analysis

METHODS OF RESIDUE ANALYSIS

A method was submitted for the determination of methomyl *per se* in grapes which is intended for general use for field crops, fruits, vegetables and ornamentals (Clark and Kennedy, 1990). Unlike other methods based on conversion to the oxime and GLC, this procedure measures methomyl directly by HPLC with UV detection. Acetonitrile extraction is followed by partitioning with hexane, elution through a commercial Florisil extraction cartridge and analysis by HPLC with detection at 233 ran. Recoveries from grape samples fortified at 0.02-5 mg/kg were 90-102% (mean 98%). The method was reported to be suitable for determinations in grapes and pears down to 0.02 mg/kg (10X noise level). Analytical recoveries during field trials on grapes and pears are discussed above.

The method used in the grape-to-wine processing studies was based on modifications of published methods. Methomyl was extracted from grapes with methanol/water (65:35) and partitioned into dichloromethane: it was extracted from wine and wine processing fractions directly with dichloromethane. In both cases residues were converted to the oxime by basic hydrolysis and this was determined by GC-MS with a mass-selective detector which monitored mass fragments m/e 105 and 88.

Analytical recoveries, at the fortification levels shown in parentheses, were: grapes 76 $\pm$ 12% (0.04-0.1 mg/kg); must 85 $\pm$ 7.9% (0.02-0.1 mg/kg); lees 78 $\pm$ 17. 5% (0. 02-0. 04 mg/kg) and wine 97 $\pm$ 11. 3% (0. 02-0. 04 mg/kg) . The limit of determination was considered to be 0.05 mg/kg for grapes and 0.02 mg/kg for wine and wine processing fractions. These levels are consistent with sample chromatograms provided. All residues in controls were reported as below the limit of determination.

NATIONAL MAXI MUM. RESIDUE LIMITS

Information was provided on Canadian and German national limits for methomyl on several commodities.

Country	Commodity	MRL (mg/kg)
Canada	cabbage	5
	lettuce	2
	apples	0.5
	celery	0.5
	citrus	1
	grapes	4
Germany	hops	4
	lettuce	2
	spinach	2
	pome fruit	1
	grapes	1
	other vegetables	0.5
	other products of plant origin	0.2

APPRAISAL

Methomyl was reviewed by the JMPR in 1975-1978 and 1986-1990 and numerous maximum residue levels were estimated or revised. Although proposals for grapes (5 mg/kg), pome fruit (2 mg/kg) and cabbage (5 mg/kg) have been advanced to step 8 of the Codex procedure, additional information has been requested and submitted owing to some reservations on the proposed limits (see ALINORM 91/24A, para 127).

In the case of grapes extensive new data have been received from the United States, reflecting GAP of 1 kg ai/ha and PHIs of 1 day for table grapes and 14 days for wine grapes. Maximum residues of 5.6 mg/kg after 1 day and 3.9 mg/kg after 14 days at GAP rates support the 5 mg/kg limit. This is consistent with the confirmation provided by the 1988 JMPR.

Although the Meeting noted that the data supplied were in the form of detailed summaries instead of original results, the manufacturer reported that they were a true presentation of the analytical figures. Submission of the original analytical reports is still desirable for the Meeting to confirm its conclusions. The Meeting was informed that these would be provided.

Concern has been expressed at the CCPR at the possibility of residues in wine resulting from the field use of methomyl on grapes. Recent studies in France indicate that no residues of methomyl are likely above the limits of determination of 0.05 mg/kg in grapes and 0.02 mg/kg in wine, must and lees, when the grapes are harvested 28 to 34 days after 2 to 4 treatments at 400 g ai/ha under the trial conditions and locations. When grapes harvested one day after the last application were processed, residues in the wine and lees were about half those in the grapes, and in must about the same as in the grapes. These concentration factors can be used to estimate residues in wine resulting from other residue levels in grapes.

These results are relevant to other data reviewed by the Meeting which show residues in wine grapes (at the 14 day PHI for wine grapes) approaching the current 5 mg/kg MRL, although generally below 2 mg/kg. Residues of the order of 1 mg/kg and possibly 2.5 mg/kg are therefore possible in wine from grapes containing methomyl at the MRL level, but residues in grapes close to 5 mg/kg would not be likely to occur frequently and hence residues above 0.5 mg/kg in wine would be rare. The fact that residues in must were of the same order as those in grapes draws attention to the need for information on residues in ready-to-bottle grape juice. The Meeting was informed that consideration will be given to the possibility of developing data on grape juice during planned trials on grapes.

It should be noted that data summaries in earlier monographs did not distinguish between table and wine grapes.

Limited residue data (and summary information) on pears involving application rates, reflecting GAP, of 0.28 mg/kg showed residues well below the CXL for pome fruit of 2 mg/kg and provide no basis for its revision. In view of the studies evaluated by the 1988 JMPR in which one residue significantly exceeded the 2 mg/kg proposal for pome fruit and information that additional trials are planned, the Meeting recommended that the situation of pome fruits should be re-examined when relevant residue data and

trials data on apples as well as freezer storage stability studies on apples and grapes could be available for the 1993 JMPR.

Limited summary data showed methomyl residues in head cabbage resulting from a single 0.2 kg/ha application in one country of $\leq$0.5 mg/kg after 7 days. The submission was intended to demonstrate that the current 5 mg/kg CXL is too high. The Meeting noted that the 5 mg/kg limit had been estimated on the basis of GAP which included multiple applications up to 1 kg/ha and a 1-day PHI. The 1988 JMPR had confirmed the need for 5 mg/kg to accommodate this GAP, which was found to be still current by the 1989 JMPR. The present Meeting agreed that the new summary data suggested (and previously provided data also supported the view) that a limit lower than 5 mg/kg would be adequate for longer PHIs, but pointed out that such a lower limit would not allow for the shorter PHIs which are still GAP.

The method used to analyse samples from the supervised trials on pears and grapes was provided. It is based on acetonitrile extraction, solvent partitioning, column clean-up and determination by HPLC with UV detection. It determines methomyl *per se*, unlike GLC methods in which residues are converted to the oxime. Analytical recoveries are acceptable for grapes and pears, for which a limit of determination of 0.02 mg/kg was reported. Chromatograms of untreated samples indicated that this is achievable for pears and probably for grapes, although for grapes 0.05 mg/kg may be more practical in routine use. The fact that mean analytical recoveries from grapes fortified at 0.02 mg/kg were higher than from those fortified at higher levels gives further grounds for regarding 0.05 mg/kg as a more practical limit of determination.

RECOMMENDATIONS

On the basis of current information on GAP and new and previously reviewed residue data, the Meeting recommended that revision of the CXLs for pome fruit, grapes and head cabbages should not be proposed at this time, but that the situation of pome fruit and grapes should be re-examined when new residue data from planned or current trials and relevant information on GAP become available.

FURTHER WORK OR INFORMATION

Desirable

1. Submission of freezer storage stability studies on grapes and pears reported to be in progress.

2. Submission of additional residue trials data on apples when available.

3. Information on methomyl residues in ready-to-bottle grape juice resulting from maximum GAP applications to wine grapes harvested at the GAP PHI.

REFERENCES

Brodsky, J. 1991. Determination of Methomyl in Grapes, Wine and Wine Processing Fractions by GC-MS Following Treatment with 'Lannate' - Season 1990, France. Study No. BE-A11-91-10-BF, July 29, 1991. Unpublished Battelle-Institute Report submitted to the 1991 JMPR by E. I. du Pont de Nemours and Company.

Clark, S. and Kennedy, S.M. 1990. Analytical Method for the Quantitation of Methomyl in Grapes. Data Requirement. USEPA Pesticide Assessment Guidelines, Subdivision 1, 171-4. Report AMR-1806-90. E.I. du Pont de Nemours and Company. Unpublished Report.

Hays, R.J. 1990. Magnitude of Residues of Methomyl in Pears. Data Requirement. USEPA Pesticide Assessment Guidelines Subdivision 0, 171-4, 10/29/90. Report No. AMR-1363-89. E.I. du Pont de Nemours and Company. Unpublished Report.

Kennedy, M.S. 1990. Magnitude of Residues on Methomyl Insecticide in Grapes. Data Requirement. USEPA Pesticide Assessment Guidelines Subdivision 0, 171-4., 11/07/90. Report No. AMR-1364-89. E.I. du Pont de Nemours and Company. Unpublished Report.

Soos, K. 1990. Methomyl - Hungarian Residue Data From Supervised Trials, 1980. National Institute of Food-hygiene and Nutrition. H-1097 Budapest, Gyali ut 31a.