THIOPHANATE-METHYL (077)[1]

First draft prepared by Dr Ursula Banasiak, Federal Institute for Risk Assessment, Berlin, Germany

EXPLANATION

Thiophanate-methyl and its related compounds benomyl and carbendazim were evaluated by the 1998 JMPR as part of the CCPR Periodic Review Programme. The Meeting estimated MRLs (expressed as carbendazim) for beans (dry), garden peas (succulent seeds), grapes, pome fruits and wheat on the basis of thiophanate-methyl residue data.

At the 34th Session of the CCPR (2002), the Committee recommended the deletion of all CXLs for thiophanate-methyl as the corresponding proposed MRLs for carbendazim (072) had reached Step 8. The Committee agreed to change the JMPR residue definition "sum of thiophanate-methyl and carbendazim, expressed as carbendazim" to "sum of benomyl, carbendazim and thiophanate-methyl, expressed as carbendazim".

The 2003 JMPR received information on GAP and national MRLs from the governments of Germany (Anonymous, 2003) and the Netherlands (Muller, 2003). The manufacturer submitted US GAP data (labels), analytical methods, information on stability of residues in stored analytical samples and new US supervised residue trial data on cherries, summer squash, snap beans, soya beans, sugar beet roots and tops, peanut nutmeat and hay.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The Meeting received information on two analytical methods used in the determination of residues. In one method, for the determination of thiophanate-methyl, carbendazim, DX-105[2] and FH-432[3], the analytes are extracted with acidic methanol, purified by liquid-liquid partition and analyzed by column-switching HPLC with two reversed phase columns and UV detection. Thiophanate-methyl and DX-105 were determined in one injection by switching the effluent from the first column from waste to the second analytical column at the appropriate retention window and measuring the absorbance at 235 nm. Carbendazim and FH-432 were determined similarly in a separate injection using a different retention window and a wavelength of 280 nm for carbendazim and 235 nm for FH-432. The LOQ is 0.05 mg/kg for each analyte. The mean and standard deviation of recoveries for thiophanate-methyl from snap bean, soybean seed, cherries, peanut nutmeat and peanut hay were 90±5%, 99±8%, 89±7%, 86±6% and 88±18%, respectively. Those for carbendazim were 84±3%, 90±15%, 79±10 %, 89±9% and 89±10%, respectively (Williams, 1995, 1996, 1998; Burton, 1998).

In the second method, for the determination of thiophanate-methyl and carbendazim, the analytes are extracted with acidic methanol, purified by solid-phase extraction on C-18 cartridges and analysed by column-switching HPLC with two reverse phase columns and UV detection by photodiode array (PDA). The wavelength selected for analysis of each compound may vary according matrix interferences experienced with the final sample extract at the anticipated retention time of the analyte. The LOQ is 0.05 mg/kg for each analyte. The mean and standard deviation of recoveries for thiophanate-methyl from

[1] This evaluation was performed for the 2003 meeting of JMPR. It is a corrigendum to Pesticide residues in food – 2003. Evaluations Part I – Residues. Appraisal, recommendations and dietary risk assessment for carbendazime and yhiophanate-methyl were already published in said document (pp 123-131).
[2] Methyl-N-[2-(N'-methoxycarbonyl-thioureido)phenylaminocarbonyl]carbamate
[3] Allophanate, dimethyl[(1,2-phenylene)bis(iminocarbonyl)]bis(carbamate)

sugar beet roots and tops were 83±12% and 73±20%. Those for carbendazim were 81±18% and 83±19% (Carr, 1998). The range of recoveries for thiophanate-methyl and carbendazim from summer squash was 56-97% and 57-138%, respectively (Carr, 1997, 1998).

Stability of pesticide residues in stored analytical samples

Stability data of thiophanate-methyl residues in soya bean seed, snap bean and sugar beets after storage for 4-5 years were submitted. The residue remaining of thiophanate-methyl in soybean seed after 5-year storage was 88-93% of the initial level (Chickering, 2003). With regard to snap bean and sugar beets, the residue remaining after 4-year storage in relation to the initial level was 77-86% and 100-106%, respectively (Whitsel, 2001a, 2001b).

Freezer stability of carbendazim was assessed over 24 months in snap beans, apples, spinach, sugar beet roots, wheat grain, and tomatoes. The residue remaining of carbendazim in the investigated crop matrices after 24-month storage was more than 80% of the initial level (Hundley, 1996).

USE PATTERN

Information on registered uses was reported to the Meeting and is shown in Table 1. Labels were submitted for USA GAP. The Meeting was informed that the compound is no longer registered in Germany.

Table 1: Registered uses of thiophanate-methyl – foliar spraying, post-harvest treatment and soil drenching.

Crop	Country	Formulation	Application				PHI, days
			Method	Rate kg ai/ha	Spray conc. kg ai/hL	No.	
Almonds	USA	WP 700 g/kg WSB[1)] 700 g/kg	foliar, red bud stage and to petal fall	0.78-1.6	0.83-1.7		
Apple	Netherlands	WP 700 g/kg	foliar, pre-blossom	0.7-1.1	0.07	1 - 3	
Apple	Netherlands	WP 700 g/kg	foliar, during blossom	0.28-0.42	0.028	1 - 2	14
Apple	Netherlands	WP 700 g/kg	foliar, 6 and 2 weeks before harvest	0.7-1.1	0.07	2	14
Apple	Netherlands	WP 700 g/kg, SC 500 g/l	post harvest flood spray treatment		0.10-0.11	1	60
Apple	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, 1st 10-20% leaf fall, 2nd 80-90% leaf fall or at the end of leaf fall	0.7 -1.1 1.4-2.1	0.07 0.14	2 1	
Apple	USA	WP 700 g/kg WSB 700 g/kg	foliar, interval 5-14 days, from green tip to petal fall	0.78-1.2	0.021-0.031	as needed	
Apricot	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 10-14 days	0.78-1.2	0.042	1 - 4	1
Beans	USA (except CA)	WP 700 g/kg, WSB 700 g/kg	foliar, interval minimum 7 days, maximum 3.1 kg ai/ha per year	0.78-1.6		as needed	14 snap and lima beans, 28 dry beans
Beans	USA (CA only)	WP 700 g/kg, WSB 700 g/kg	foliar, at 50-70% of full bloom or 1st 10-30% of full blooming, 2nd 4-7 days later or at peak bloom	1.2-1.6 or 0.78-1.2		1 or 2	14 snap and dry beans, 28 lima beans
Canola	USA (ND, MI, MO only)	WSB 700 g/kg	foliar, 20-50% of blooming or 20-30% and 40-50% of blooming, maximum 1.6 kg ai/ha	0.78-1.6 or 0.78		1 or 2	

Crop	Country	Formulation	Application				PHI, days
			Method	Rate kg ai/ha	Spray conc. kg ai/hL	No.	
			per year				
Cherries	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 10-14 days	0.78-1.2	0.032-0.042	1-3	1
Cucumber	USA	WP 700 g/kg, WSB 700 g/kg	ground treatment or aerial, interval 7-14 days, WSB: maximum 2.2 kg ai/ha per year	0.2-0.39		as needed	
Courgette	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, interval 10-14 days	0.35-1.1	0.07	1-3	3 G
Dwarf beans (dry)	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, 3 days before top blossoming, interval 5-7 days	1.0-2.1	0.25-1.1	1-2	14
Eggplant	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, interval 10-14 days	0.35-1.1	0.07	1-3	3 G
Garlic	USA	WSB 700 g/kg	Dipping before planting		0.084	1	
Grapes	USA	WSB 700 g/kg	foliar, interval 14 days, maximum 3.1 kg ai/ha per year	0.78-1.2			14
Leek	Netherlands	WP 700 g/kg, SC 500 g/l	dipping before planting		0.10-0.14	1	
Melons	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, interval 10-14 days	0.35-1.1	0.07	1-3	3 G
Melons	Netherlands	WP 70	soil drench after planting	0.7 g ai per plant		1-3	3 G
Melons	USA	WP 700 g/kg, WSB 700 g/kg	ground treatment or aerial, interval 7-14 days, WSB: maximum 2.2 kg ai/ha per year	0.2-0.39		as needed	
Mushrooms	Netherlands	WP 700 g/kg	surface drench of bed, after casing	14	0.093-0.14	1	5 G
Mushrooms	Netherlands	WP 700 g/kg	for mechanically harvested champignons: spraying of aerial parts immediately after harvest of the 1st and 2nd flush	3.5	0.035	1-2	5 G
Nectarine	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 10-14 days	0.78-1.2	0.042		1
Onion	Netherlands	WP 700 g/kg, SC 500 g/l	seed treatment	0.14 kg ai/ 100 kg seed		1	
Onion	Netherlands	WP 700 g/kg, SC 500 g/l	plant onion and shallots: dipping before planting		0.2–0.21	1	
Onion	USA	WP 700 g/kg	in furrow at planting or broadcast	0.35-0.54 g/m or 9.3-12.6			
Peanut	USA	WP 700 g/kg, WSB 700 g/kg	foliar, after planting, interval 14-21 days (WP), 7-14 days (WSB)	0.39		as needed	14
Peach	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 10-14 days	0.78-1.8	0.032-0.063	as needed	1
Pear	Netherlands	WP 700 g/kg	foliar, pre-blossom	0.7-1.1	0.07	1 – 3	
Pear	Netherlands	WP 700 g/kg	foliar, 6 and 2 weeks before harvest	0.7-1.1	0.07	2	14
Pear	Netherlands	WP 700 g/kg, SC 500 g/l	post harvest shower treatment		0.10-0.11	1	60
Pear	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, 1st 10-20% leaf fall, 2nd 80-90% leaf fall or at the end of leaf fall	0.70-1.1 or 1.4-2.1	0.07 or 0.14	2 or 1	
Pear	USA	WSB 700 g/kg	foliar, interval 5-10 days, maximum 3.1 kg ai/ha per year	0.78	0.021	as needed	1
Pecan	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 3-4 weeks, aerial treatment in GA, AR, LA, MS, OK, TX only	0.39-0.78		as needed	
Pistachio	USA	WSB 700 g/kg	ground or aerial treatment	1.2-1.6	0.13-0.17	as	

Crop	Country	Formulation	Application				PHI, days
			Method	Rate kg ai/ha	Spray conc. kg ai/hL	No.	
nut			maximum 1.6 kg ai/ha per year		or 0.64-0.86	needed	
Plums	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 10-14 days	0.78-1.2	0.042	as needed	1
Potato, seed	Netherlands	WP 700 g/kg, SC 500 g/l	post harvest use, spraying of potatoes, not for consumption or animal feed	0.007 kg ai/ 100 kg seed		1	
Potato, seed	Netherlands	SC 350 g/l	post harvest use, spraying of potatoes, not for consumption or animal feed	0.007 kg ai/ 100 kg seed		1	
Potato	USA (except CA)	WSB 700 g/kg	foliar, interval 7-14 days, maximum 3.1 kg ai/ha per year	0.78-1.2		as needed	21
Pumpkin	USA	WP 700 g/kg WSB 700 g/kg	ground treatment or aerial, interval 7-14 days, WSB: maximum 2.2 kg ai/ha per year	0.2-0.39		as needed	
Soya bean	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 14-21 days; do not graze or feed treated vines or hay to livestock	0.39-0.78	2	2	
Squash, summer	USA	WP 700 g/kg, WSB 700 g/kg	ground treatment or aerial, interval 7-14 days, WSB: maximum 2.2 kg ai/ha per year	0.2-0.39		as needed	
Strawberry	USA	WP 700 g/kg, WSB 700 g/kg	foliar, interval 7-10 days, maximum 3.1 kg ai/ha per year	0.59-0.78		as needed	1
Sugar beet	USA	WP 700 g/kg WSB 700 g/kg	foliar, interval 14-21 days; maximum 2.4 kg ai/ha per year	0.39 0.39-0.78		as needed	21
Tomato	Netherlands	WP 700 g/kg, SC 500 g/l	foliar	0.20-0.63	0.04-0.042	2 - 3	3 G
Triticale	USA (ID, OR, WA only)	WSB 700 g/kg	ground or aerial treatment, after tillering	0.78		1	hay 90
Watermelon	USA	WSB 700 g/kg	ground treatment or aerial, interval 7-14 days, WSB: maximum 2.2 kg ai/ha per year	0.2-0.39		as needed	
Wheat	Netherlands	WP 700 g/kg, SC 500 g/l	foliar, at crop height of 25 cm	0.7–0.75	0.12-0.38	1	35
Wheat (fall seeded)	USA (ID, OR, WA only)	WP 700 g/kg, WSB 700 g/kg	ground or aerial treatment, after tillering	0.78		1	hay 90

1) WSB: 70% wettable powder in water soluble bags

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

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

Fruits	Table 2	Cherries
Vegetables	Table 3	Summer squash
	Table 4	Snap beans
	Table 5	Soya bean
	Table 6	Sugar beet root
Oilseed	Table 7	Peanut
Feed commodities	Table 8	Snap bean vines
	Table 9	Soya bean hay
	Table 10	Peanut hay
	Table 11	Sugar beet tops

The residue trials were well documented with full laboratory and field reports. Laboratory reports included method validation. Dates of analyses were also provided. Periods of freezer storage between sampling and analysis were recorded for all trials and were within the acceptable determined stability period. Field reports provided data on the sprayers used and their calibration, plot size, residue sample size and sampling dates.

Where residues were not detected, data are recorded in the Tables as below the LOQ. Residue data, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Although trials included control plots, no control data are recorded except where residues in control samples exceeded the LOQ. Residues are recorded unadjusted for procedural recoveries. Double-underlined residue values are from treatments of maximum GAP and have been used for the estimation of maximum residue levels.

Thiophanate-methyl, carbendazim, FH-432 and DX-105 were determined by the methods used. Because FH-432 and DX-105 are not included into the residue definition, only thiophanate-methyl (TM) and carbendazim (MBC) residues were reported in the Tables (as TM and MBC). The total residues are sum of thiophanate-methyl and carbendazim, calculated as carbendazim.

Table 2. Thiophanate-methyl residues in cherries from supervised trials in the USA (Leppert and Castro, 1996), Report RD-II02093. In general, results for fruits without stones, except 0-day samples of trials 23C-91 and 23D-91 for fruits with stones.
Variety Montmorency: sour cherry; Lambert: sweet cherry; Bada sweet: sweet cherry.

Trial no., year, location, variety	Form	Application				PHI, days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
23A-92, 1996, MI, Conklin, Montmorency[1)]	WP	Ground	1.2	0.11	5	0 1	1.83 1.01	0.18 0.25	1.2 <u>0.81</u>
23B-91, 1996, MI, Conklin, Montmorency	SC	Aerial	1.2	2.3-2.5	5	0 1	0.58 0.49	<0.05 0.11	0.38 <u>0.38</u>
23F-91, 1996, WA, White Salmon, Lambert[2)]	WP	Ground	1.2	0.08	5	0 1	1.32 0.71	<0.05 0.13	0.79 <u>0.53</u>
23E-91,1996, WA, White Salmon, Lambert	SC	Aerial	1.2	1.6-2.2	5	0 1	1.02 0.83	0.09 0.14	0.66 <u>0.60</u>
23C-91, 1996, NY, Sodus, Montmorency[1)]	SC	Ground	1.2	0.13	5	0 1	5.84 3.27	0.51 0.53	3.8 <u>2.4</u>
23D-91, 1996, NY, Sodus, Montmorency[1)]	WDG	Ground	1.2	0.13	5	0 1	2.3 1.93	0.39 0.40	1.7 <u>1.5</u>
23G-91, 1996, OR, Cornelius, Bada sweet[2)]	WDG	Ground	1.2	0.13	5	0 1	5.95 3.70	0.62 0.64	3.9 <u>2.7</u>
23H-91, 1996, OR, Gaston, Montmorency[2)]	WDG	Ground	1.2	0.10	5	0 1	18.96 14.82	0.67 0.8	11 <u>9.1</u>

[1)] broadcast treatment using airblast sprayers
[2)] Statement by the manufacturer: equipment (single nozzle orchard gun) did not simulate commercial practices.

WDG: Water Dispersible Granule

Table 3. Thiophanate-methyl residues in summer squash from supervised trials in the USA (Carr, 1997), Report RD-II02092.

Trial no., year, location, variety	Form	Application				PHI, days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
27A-91, 1991, CA, Fresno, Ambassador	WP	Ground	0.35	0.07	8	1	0.16	<0.05	0.14
27B-91, 1991, CA, Madera, Ambassador	WP	Aerial	0.39	0.25	8	1	0.083	<0.05	0.1
27G-91, 1991, NC, Gaston, Golden Summer Crookneck	WP	Ground	0.40	0.11	8	1	0.055	<0.05	0.08
27C-91, 1991, FL, Jupiter, Goldie	SC	Aerial	0.39	0.70	8	1	<0.05	<0.05	<0.08
27E-91, 1991, GA, Winterville, Yellow Crookneck	SC	Ground	0.38	0.16	8	1	0.34	0.13	0.32
27H-91, 1991, NY, Phelps, President	SC	Ground	0.39	0.14	8	1	0.12	<0.05	0.12
27D-91, 1991, FL, Luxahatchee, Dixie	WDG	Ground	0.40	0.09	8	1	0.12	<0.05	0.12
27F-91, 1991, MI, Conklin, Lemondrop L	WDG	Ground	0.39	0.15	8	1	<0.05	<0.05	<0.08
27I-91, 1991, OR, Hillsboro, Elete	WDG	Ground	0.39	0.17	8	1	0.057	<0.05	0.08
27J-91, 1991, TX, Donna, Early Profile Straighthneck	WDG	Ground	0.39	0.14	8	1	0.068	<0.05	0.09

Table 4. Thiophanate-methyl residues in snap beans from supervised trials in the USA (Leppert, 1996), Report RD-II02090.

Trial no., year, location, variety	Form	Application				PHI, days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
08A-90, 1990, FL, Loxahatchee, Triumph	SC	Aerial	1.6	5.6	2	14	<0.05	<0.05	<0.08
08B-90, 1990, MN, Theilman, Hystle	WDG	Ground	1.6	0.82-0.84	2	14	<0.05	<0.05	<0.08
08C-90, 1990, MI, Marcellus, Tendercrop	SC	Ground	1.6	0.34	2	14	<0.05	<0.05	<0.08
08D-90, 1999, NJ, Bridgeton, Provider	WDG	Ground	1.6	0.38	2	14	0.13	0.15	0.22
08E-90, 1990, NY, Sodus, Tendergreen	SC	Aerial	1.6	2.7	2	14	0.07	0.10	0.14

Trial no., year, location, variety	Form	Application				PHI, days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
08F-90, 1990, NY, Sodus, Tendergreen	WDG	Ground	1.6	0.84-0.85	2	14	0.70	0.41	0.45
08G-90, 1990, OR, Hillsboro, OSU 91	SC	Ground	1.6	0.48	2	14	<0.05	<0.05	<0.08
08H-90, 1990, PA, Northampton, Burpee Stringless	SC	Ground	1.6	0.63-0.64	2	14	<0.05	0.06	0.09
08I-90, 1990, TN, Toone, Contender	WDG	Ground	1.6	0.85	2	14	<0.05	<0.05	<0.08
08J-90, 1990, WI, Janesville, Hy-Style	SC	Aerial	1.6	3.4	2	14	<0.05	<0.05	<0.08
08K-90, 1990, WI, Delavan, Peak	WDG	Ground	1.6	0.42	2	14	0.06	0.13	0.16

Table 5. Thiophanate-methyl residues in soya beans (dry) from supervised trials in the USA (Castro, 1998), Report RD-II02091.

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
BR-90-42-A,1990, AR, Scott	WDG	Ground	0.78	0.84	3	14	<0.05	<0.05	<0.08
BR-90-42-B, 1990, GA, Meigs	SC	Aerial	0.82-0.85	2.9 -3.1	3	14	0.09	0.2	0.25
BR-90-42-C, 1990, IA, Muscatine	SC	Aerial	0.78	0.42	3	16	<0.05	<0.05	<0.08
BR-90-42-D,1990, IA, Muscatine	WDG	Ground	0.78	0.42-0.43	3	16	<0.05	<0.05	<0.08
BR-90-42-E, 1990, IL, Carlyle	WDG	Ground	0.66	0.35-0.59	3	14	<0.05	<0.05	<0.08
BR-90-42-G,1990, IN, Hebron	WDG	Ground	0.80	2.9	3	15	<0.05	<0.05	<0.08
BR-90-42-H,1990, LA, Rosa	WDG	Ground	0.78	2.8	3	14	<0.05	0.29	0.31
BR-90-42-I, 1990, MN, Theilman	WDG	Ground	0.78	0.84	3	14	<0.05	<0.05	<0.08
BR-90-42-J, 1990, MO, Leonard	SC	Ground	0.64-0.84	-	3	14	<0.05	<0.05	<0.08
BR-90-42-K,1990, MS, Hernando	WDG	Ground	0.78	0.84	3	14	<0.05	<0.05	<0.08
BR-90-42-L, 1990, NE, York	SC	Ground	0.78	-	3	14	<0.05	<0.05	<0.08
BR-90-42-M,1990, OH, New Holland	SC	Ground	0.78	0.32-0.34	3	14	<0.05	<0.05	<0.08

Table 6. Thiophanate-methyl residues in sugar beet roots from supervised trials in the USA (Carr, 1998), Report RD-II02089.

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
97284-1, 1997, MN, Moorhead	WSB	Seed[1] + foliar	0.81	0.56	3[2]	21	<0.05	<0.05	<0.08
97284-2, 1997, ND, Northwood	WSB	Seed[1] + foliar	0.78	0.56	3[2]	15 21 27	<0.05 <0.05 <0.05	<0.05 <0.05 <0.05	<0.08 <0.08 <0.08
97284-3, 1997, ND, Northwood	WSB	Seed[1] + foliar	0.78	0.56	3[2]	21	<0.05	<0.05	<0.08
97284-4, 1997, ND, Richland County	WSB	Seed[1] + foliar	0.78	0.28	3[2]	21	<0.05	<0.05	<0.08
97284-5, 1997, MI, Conklin	WSB	Seed[1] + foliar	0.78	0.32	3[2]	21	<0.05	<0.05	<0.08
97284-6, 1997, ND, Velva	WSB	Seed[1] + foliar	0.78	0.42	3[2]	21	<0.05	<0.05	<0.08
97284-7, 1997, Levelland, TX	WSB	Seed[1] + foliar	0.81	0.42	3[2]	21	<0.05	<0.05	<0.08
97284-8, 1997, Eaton, CO	WSB	Seed[1] + foliar	0.81	0.72	3[2]	21	<0.05	<0.05	<0.08
97284-10, 1997, CA, Porterville	WSB	Seed[1] + foliar	0.78	0.28	3[2]	21	<0.05	<0.05	<0.08
97284-11, 1997, Rupert, ID	WSB	Seed[1] + foliar	0.78	0.42	3[2]	21	<0.05	<0.05	<0.08
97284-12, 1997, ID, Jerome	WSB	Seed[1] + foliar	0.80	0.30	3[2]	21	<0.05	<0.05	<0.08

[1] Seed treatment 0.25 kg ai/100 kg of seed [2] Number of foliar applications
WSB: wettable powder in water soluble bags

Table 7. Thiophanate-methyl residues in peanut (nut meat) from supervised trials in the USA (Bradway, 1998), Report RD-II02094. Peanut plants were inverted 14 days after last application and dried for several days in the field. The one exception was trial J where hay and nuts were collected at the 14-day PHI.

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
01A-91, 1991, AL, Grangerburg	WDG	Ground, broadcast	0.39	0.12	6	14+4	<0.05	<0.05	<0.08
01B-91, 1991, AL, Grangerburg	SC	Ground, broadcast	0.39	1.1	6	14+4	<0.05	<0.05	<0.08
01C-91, 1991, GA, Meigs	WDG	Ground, broadcast	0.39	0.15	6	14+5	<0.05	<0.05	<0.08
01D-91, 1991, GA, Meigs	SC	Ground, broadcast	0.39	0.87	6	14+2	<0.05	<0.05	<0.08
01E-91, 1991, GA, Meigs	SC	Ground, broadcast	0.39	0.15	6	14+5	<0.05	<0.05	<0.08
01F-91, 1991, NC, Whitakers	WDG	Ground, broadcast	0.39	0.17	6	14+7	<0.05	<0.05	<0.08
01G-91, 1991, NC, Whitakers	SC	Ground, broadcast	0.39	0.17	6	14+7	<0.05	<0.05	<0.08
01H-91, 1991, TX, Pattison	SC	Ground, broadcast	0.39	-	6	14+3	<0.05	<0.05	<0.08

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
01I-91, 1991, TX, Pattison	WDG	Ground, broadcast	0.39	0.21	6	14+ 3	<0.05	<0.05	<0.08
01J-91, 1991, VA, Emporia	WDG	Ground, broadcast	0.39	0.11	6	14	<0.05	<0.05	<0.08

Table 8. Thiophanate-methyl residues in snap bean vines from supervised trials in the USA (Leppert, 1996), Report RD-II02090.

Trial no., year, location, variety	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
08A-90, 1990, FL, Loxahatchee Triumph	SC	Aerial	1.6	5.6	2	14	<0.05	<0.05	<0.08
08B-90, 1990, MN, Theilman, Hystle	WDG	Ground	1.6	0.82-0.84	2	14	3.51	2.01	4.0
08C-90, 1990, MI, Marcellus, Tendercrop	SC	Ground	1.6	0.34	2	14	0.10	0.56	0.62
08D-90, 1990, NJ, Bridgeton, Provider	WDG	Ground	1.6	0.38	2	14	7.88	2.91	7.3
08E-90, 1990, NY, Sodus, Tendergreen	SC	Aerial	1.6	2.7	2	14	2.77	1.05	2.6
08F-90, 1990, NY, Sodus, Tendergreen	WDG	Ground	1.6	0.84-0.85	2	14	13.16	3.65	11
08G-90, 1990, OR, Hillsboro, OSU 91	SC	Ground	1.6	0.48	2	14	0.93	1.46	2.0
08H-90, 1990, PA,NorthamptonBurpee Stringless	SC	Ground	1.6	0.63-0.64	2	14	2.44	1.38	2.7
08I-90, 1990, TN, Toone, Contender	WDG	Ground	1.6	0.85	2	14	0.42	0.42	0.65
08J-90, 1990, WI, Janesville, Hy-Style	SC	Aerial	1.6	3.4	2	14	2.17	1.95	3.2
08K-90, 1990, WI, Delavan, Peak	WDG	Ground	1.6	0.42	2	14	5.18	5.18	8.1

Table 9. Thiophanate-methyl residues in soya bean hay from supervised trials in the USA (Castro, 1998), Report RD-II02091.

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
BR-90-42-A,1990, AR, Scott	WDG	Ground	0.78	0.84	3	14	<0.2	<0.2	<0.3
BR-90-42-B, 1990, GA, Meigs	SC	Aerial	0.82-0.85	2.9-3.1	3	14	0.74	3.4	3.8
BR-90-42-C, 1990, IA, Muscatine	SC	Aerial	0.78	0.42	3	16	<0.2	3.2	3.3
BR-90-42-D,1990, IA, Muscatine	WDG	Ground	0.78	0.42-0.43	3	16	<0.2	4.3	4.4
BR-90-42-E, 1990, IL, Carlyle	WDG	Ground	0.66	0.35-0.59	3	14	<0.2	0.77	0.88
BR-90-42-G,1990, IN, Hebron	WDG	Ground	0.80	2.86	3	15	<0.2	2.5	2.6
BR-90-42-H,1990, LA, Rosa	WDG	Ground	0.78	2.82	3	14	0.24	5.2	5.3
BR-90-42-I,1990, MN, Theilman	WDG	Ground	0.78	0.84	3	14	1.0	8.9	9.5
BR-90-42-J,1990, MO, Leonard	SC	Ground	0.64-0.84	-	3	14	<0.2	4.7	4.8
BR-90-42-K,1990, MS, Hernando	WDG	Ground	0.78	0.84	3	14	<0.2	0.84	0.95
BR-90-42-L,1990, NE, York	SC	Ground	0.78	-	3	14	<0.2	<0.2	<0.3
BR-90-42-M,1990, OH, New Holland	SC	Ground	0.78	0.32-0.34	3	14	<0.2	1.97	2.1

Table 10. Thiophanate-methyl residues in peanut hay from supervised trials in the USA (Bradway, 1998), Report RD-II02094. Peanut plants were inverted 14 days after last application and dried for several days in the field. The one exception was trial J where hay and nuts were collected at the 14-day PHI.

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
01A-91, 1991, AL, Grangerburg	WDG	Ground, broadcast	0.39	0.12	6	14+ 4	<0.5	<0.5	<0.8
01B-91, 1991, AL, Grangerburg	SC	Ground, broadcast	0.39	1.09	6	14+ 4	<0.5	<0.5	<0.8
01C-91, 1991, GA, Meigs	WDG	Ground, broadcast	0.39	0.15	6	14+ 5	<0.5	0.63	0.91
01D-91, 1991, GA, Meigs	SC	Ground, broadcast	0.39	0.87	6	14+ 2	<0.5	<0.5	<0.8
01E-91, 1991, GA, Meigs	SC	Ground, broadcast	0.39	0.15	6	14+ 5	<0.5	<0.5	<0.8
01F-91, 1991, NC, Whitakers	WDG	Ground, broadcast	0.39	0.17	6	14+ 7	<0.5	1.34	1.6
01G-91, 1991, NC, Whitakers	SC	Ground, broadcast	0.39	0.17	6	14+ 7	<0.5	0.84	1.1
01H-91, 1991, TX, Pattison	SC	Ground, broadcast	0.39		6	14+ 3	<0.5	<0.5	<0.8
01I-91, 1991, TX, Pattison	WDG	Ground, broadcast	0.39	0.21	6	14+ 3	<0.5	<0.5	<0.8
01J-91, 1991, VA, Emporia	WDG	Ground, broadcast	0.39	0.11	6	14	<0.5	1.82	2.1

Table 11. Thiophanate-methyl residues in sugar beet tops from supervised trials in the USA (Carr, 1998), Report RD-II02089. Duplicate composite samples were collected from each treated plot (total residues as carbendazim are the mean of the two results).

Trial no., year, location	Form	Application				PHI days	Residues, mg/kg		
		Method	kg ai/ha	kg ai/hL	No.		TM	MBC	Total as MBC
97284-1, 1997, MN, Moorhead	WSB	Seed[1] + foliar	0.81	0.56	3[2]	21	<0.05 0.15	<0.05 0.086	<0.08 0.17 mean 0.13
97284-2, 1997, ND, Northwood	WSB	Seed[1] + foliar	0.78	0.56	3[2]	21	<0.05 0.055	0.093 0.38	0.12 0.41 mean 0.33
97284-3, 1997, ND, Northwood	WSB	Seed[1] + foliar	0.78	0.56	3[2]	21	0.26 0.14	0.44 0.37	0.59 0.45 mean 0.52
97284-4, 1997, ND, Richland County	WSB	Seed[1] + foliar	0.78	0.28	3[2]	21	0.095 0.11	0.17 0.15	0.22 0.21 mean 0.22
97284-5, 1997, MI, Conklin	WSB	Seed[1] + foliar	0.78	0.32	3[2]	21	<0.05 0.055	0.25 0.30	0.28 0.33 mean 0.31
97284-6, 1997, ND, Velva	WSB	Seed[1] + foliar	0.78	0.42	3[2]	21	0.32 0.29	0.51 0.52	0.69 0.68 mean 0.69
97284-7, 1997, Levelland, TX	WSB	Seed[1] + foliar	0.81	0.42	3[2]	21	0.61 0.59	0.47 0.53	0.81 0.86 mean 0.84
97284-8, 1997, Eaton, CO	WSB	Seed[1] + foliar	0.81	0.72	3[2]	21	0.24 0.22	0.68 0.50	0.81 0.62 mean 0.72
97284-10, 1997, CA, Porterville	WSB	Seed[1] + foliar	0.78	0.28	3[2]	21	3.1 1.8	0.88 0.72	2.6 1.7 mean 2.2
97284-11, 1997, Rupert, ID	WSB	Seed[1] + foliar	0.78	0.42	3[2]	21	0.077 0.04	0.19 0.06	0.23 0.08 mean 0.16
97284-12, 1997, ID, Jerome	WSB	Seed[1] + foliar	0.80	0.30	3[2]	21	0.08 0.16	0.15 0.19	0.19 0.28 mean 0.24

[1] Seed treatment 0.25 kg ai/100 kg of seed [2] Number of foliar applications

NATIONAL MAXIMUM RESIDUE LIMITS

The Meeting was aware of the national MRLs shown in Table 12.

Table 12. National MRLs for thiophanate-methyl.

Country	Residue definition	Commodity	MRL, mg/kg
Italy	Sum of carbendazim, benomyl and thiophanate-methyl, expressed as carbendazim	Cereals, Hops, Tea, Potato, Other fruits, vegetables, oil seeds and pulses	0.1
		Soybeans	0.2
		Vegetable marrow	0.3
		Brussels sprouts, Eggplant, Melon, Plum, Pumpkin, Tomatoes	0.5
		Apricot, Banana, Cucumber, Mushrooms, Peach	1
		Celery, Dry beans, Grapes, Pome fruits, Rhubarb	2
		Head brassicas (except Brussels sprouts)	3
		Citrus fruits, Lettuce	5
France	Sum of carbendazim, benomyl and thiophanate-methyl, expressed as carbendazim	Almond, Cabbage, Cherry, Garlic, Strawberry, Onion, Peas, Potato	0.1
		Eggplant, Melon, Plum, Tomato	0.5
		Apricot, Peach	1
		Apple, Pear, Grape	2
Germany	Sum of carbendazim, benomyl and thiophanate-methyl, expressed as carbendazim	Other plant commodities	0.05
		Tea	0.1
		Soybean	0.2
		Zucchini	0.3
		Barley, Cucumber, Eggplant, Melon, Pumpkin	0.5
		Banana, Burdock, Cauliflower, Celery, Lettuce, Onion, Peas, Potato, Tomato, Turnip, Mushroom	1
		Strawberry,	1.5
		Stone fruits	2
		Grape	3
		Citrus	5
Japan	Sum of carbendazim and thiophanate-methyl, expressed as thiophanate-methyl	Tea	20
		Fruits Vegetables	5
		Rice	2
		Beans and Peas, Cereals except rice, Rot and Tubers, Sugar beet	1
Netherlands	Sum of carbendazim, benomyl and thiophanate-methyl, expressed as carbendazim	Others	0.1
		Soybeans	0.2
		Courgettes	0.3
		Brussels sprouts, Eggplant, Melon, Plums, Tomatoes, Winter squash	0.5
		Apricots, Bananas, Cucumber, Mushrooms, Peaches, Nectarines	1
		Beans (dry), Celery, Table and wine grapes, Pome fruit, Rhubarb	2
		Head cabbage	3
		Citrus fruit, Lettuce	5

Country	Residue definition	Commodity	MRL, mg/kg
Spain	Sum of carbendazim, benomyl and thiophanate-methyl, expressed as carbendazim	Almonds, Cereals, Hazel nut, Sugar beet, Others	0.1
		Zucchini	0.3
		Eggplant, Melon, Plums, Pumpkin, Tomato	0.5
		Banana, Cucumber, Nectarine	1
		Apple, Beans (grain), Celery, Pear, Pome fruit, Vines	2
		Citrus, Lettuce	5
USA	Thiophanate-methyl, its oxygen analogue [dimethyl-4,4'-o-phenylene-bis(allophanate)] and its benzimidazole containing metabolites expressed as thiophanate-methyl	Wheat grain	0.05
		Sugarcane (seed piece treatment), Wheat hay and straw	0.1
		Almonds, Bananas (pulp), Peanuts, Pecans, Soybeans, Sugar beet roots	0.2
		Almonds hull, Cucumbers, Melons, Pumpkins, Squash	1
		Bananas, Beans dry and snap	2
		Celery, Onions dry and green	3
		Grapes, Strawberries	5
		Apricots, Cherries, Nectarines, Peaches, Peanuts forage and hay, Plums, Prunes, Sugar beet tops	15
		Apple pomace dried	40
		Beans forage and hay	50

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