

KRESOXIM-METHYL (199)

First draft prepared by Mr D Lunn, Ministry for Primary Industries, New Zealand

EXPLANATION

Kresoxim-methyl is a strobilurin fungicide, acting by inhibiting mitochondrial respiration.

Kresoxim-methyl was first evaluated for toxicology and residues by JMPR in 1998 and a periodic evaluation was conducted by the 2018 JMPR. An ADI of 0-0.3 mg/kg bw was established and an ARfD was not considered necessary.

For plant commodities, the definition of the residue for compliance with the MRL is: kresoxim-methyl and for dietary risk assessment is: Sum of kresoxim-methyl and metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9) including their conjugates, expressed as kresoxim-methyl

For animal commodities, the definition of the residue for compliance with the MRL and for dietary risk assessment is: Sum of metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9), expressed as kresoxim-methyl

The residue is not fat-soluble.

The 2018 JMPR also noted that if future uses of kresoxim-methyl result in an increase of the dietary exposure to metabolite 490M2, to more than the threshold of toxicological concern (TTC) for a Cramer Class III compound, a reconsideration of the residue definition for dietary exposure may be necessary.

Kresoxim-methyl was scheduled at the Fiftieth Session of the CCPR for evaluation of additional uses by the 2019 JMPR. The Meeting received new GAP information and new supporting residue information for pome fruit.

METHODS OF RESIDUE ANALYSIS**Analytical methods**

The 2018 JMPR reviewed and summarized analytical method descriptions and validation data for kresoxim-methyl and metabolites 490M1, 490M2 and 490M9 in plant matrices and for metabolites 490M1, 490M2 and 490M9 in animal matrices.

These methods (including BASF Methods 350/3 and 351/1 used in the pome fruit field trials) employed extraction with methanol or methanol/water, liquid-liquid partitioning (isooctane or dichloromethane), SPE (silica gel, C18 or NH₂ cartridge) clean-up and LC-MS/MS, GC-ECD or GC-MS analysis for kresoxim-methyl. The LOQ for kresoxim-methyl is 0.05 mg/kg.

Method 350/3 (LC-LC-UV) also included an alkaline hydrolysis step (10 M KOH, 1 hour) to measure residues of kresoxim-methyl as kresoxim acid (490M1) and an additional enzymatic hydrolysis step (hesperidinase and β -glucosidase) to measure metabolites 490M2 and 490M9 (free and conjugated). The LOQs for kresoxim-methyl plus 490M2 and for metabolite 490M2 are both 0.05 mg/kg.

STABILITY OF PESTICIDE RESIDUES IN STORED ANALYTICAL SAMPLES

The 2018 JMPR concluded that in frozen stored analytical samples, residues of kresoxim-methyl and metabolites 490M2 and 490M9 were stable in high starch and high protein matrices for at least 24 months. In high water and high acid content matrices, residues of kresoxim-methyl and the 490M2 and 490M9 glucosides were stable for at least 12 months in high water and acid content matrices.

USE PATTERNS

New information on GAP in Australia, China, Europe, Japan, South America, and the USA was provided to the Meeting for foliar applications of WG formulations of kresoxim-methyl on pome fruit. The relevant GAP information from the available labels is summarized in following table.

Table 1 Registered uses of kresoxim-methyl on pome fruit – foliar applications (WG formulations).

Crop	Country	Application			Max/season		PHI (days)	Remarks
		kg ai/ha (max)	g ai/100L	water L/ha (min)	no	kg ai/ha		
Pome fruits								
Pome fruit ^a	USA	0.22		2800	4	0.9	30	7-14 day RTI
Apples	Australia		5		3		42	7-10 day RTI
	Belgium	0.1	6.5	1500	4		35	10-14 day RTI
	Canada	0.225			4	0.9	30	10-14 day RTI
	France	0.1			2		28	10 day minimum RTI
	Netherlands	0.1			4		28	7 day minimum RTI
	Spain	0.1		200	4		28	7-14 day RTI
	UK	0.1		150	4		28	10-14 day RTI
Pears	Australia		5		3		42	7-10 day RTI
	Belgium	0.1	6.5	1500	4		35	10-14 day RTI
	Canada	0.18			4	0.72	30	7-14 day RTI
	France	0.1			2		28	10 day minimum RTI
	Netherlands	0.1	10		4		28	7 day minimum RTI
	Spain	0.1		200	4		28	7-14 day RTI
Medlar	France	0.1			2		28	10 day RTI
Crabapple	France	0.1			2		28	10 day minimum RTI
Nashi pear	France	0.1			2		14	10 day minimum RTI
Quince	France	0.1			2		14	10 day minimum RTI
	Spain	0.1		200	4		28	7-14 day RTI

^a USA: **Pome fruit**: Includes apple; crabapple; loquat; mayhaw; pear; pear, oriental; quince.

RESULTS OF SUPERVISED RESIDUE TRIALS ON CROPS

The Meeting evaluated new pome fruit information from North America and Europe.

The supervised trials were well documented with laboratory and field reports. Laboratory reports included procedural recoveries with spiking at residue levels similar to those occurring in samples from the supervised trials. Intervals of freezer storage between sampling and analysis were recorded for all trials and were covered by the conditions of the freezer storage stability studies.

Results from replicated field plots are presented as average values and have not been corrected for concurrent method recoveries. Residues and application rates have been rounded to two significant digits and the results from trials conducted according to the maximum GAP and used for the estimation of maximum residue levels have been (underlined).

Control (untreated) plots were sampled and analysed in all trials, and if residues in these control samples exceeded the LOQ, this is reported as (c=nn mg/kg).

Where results from separate plots with distinguishing characteristics such as different formulations, varieties or treatment schedules were reported, results are listed for each plot, and the highest value has been used in calculations of maximum residue levels and STMRs. Trials that are not considered to be independent have their location information surrounded by a heavy border (Tables 4 and 5).

In the following tables, ‘total residues’ refers to the sum of kresoxim-methyl and metabolite 490M1 (expressed as kresoxim-methyl – conversion factor: 1.047) plus metabolite 490M9 (expressed as kresoxim-methyl-conversion factor: 0.994).

*Pome fruit**Apples, pears*

In field trials on apples and pears, conducted in Europe in 1995, eight foliar applications of kresoxim-methyl (WG formulations) were applied, about 10 days apart, made using tractor-mounted airblast sprayers or a vertical boom sprayer to apply about 300 litres spray mix/ha, increasing to about 600 litres/ha later in the season. Plot sizes ranged from 28-200 square metres.

Samples of at least 2 kg (or 24 units) whole fruit were frozen and stored for up to 4 months before GC-ECD analysis using Method BASF No. 351/1 to measure residues of kresoxim-methyl. The average recovery rate was 88% and the limit of quantitation (LOQ) was 0.05 mg/kg.

Table 2 Residues of kresoxim-methyl in apples following eight foliar treatments of kresoxim-methyl (WG formulations)

APPLE Country, year Location (Variety)	Application			DALA	Residues (mg/kg)				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total	
GAP: Netherlands	4	0.1	-	28	7-day minimum retreatment interval				
Germany, 1994 Schleswig-Holstein (James Grieve)	8	0.099-0.1	310-590	0	0.09				1995/10418 DO5/02/94
				21	< 0.05				
				28	< 0.05				
				35	< 0.05				
Germany, 1994 Baden-Württemberg (James Grieve)	8	0.097-0.11	310-590	0	< 0.05				1995/10418 DU2/02/94
				21	< 0.05				
				29	< 0.05				
				35	< 0.05				
Germany, 1994 Rheinland-Pfalz (Melrose)	8	0.1	300-610	0	0.12				1995/10418 DU3/03/94
				21	0.07				
				28	< 0.05				
				35	< 0.05				
France, 1994 31330 Merville Garonne (Golden)	8	0.098-0.11	290-610	0	0.22				1995/10418 FR8/09/94
				21	0.09				
				28	< 0.05				
				35	< 0.05				
France, 1994 31340 Sayrac Garonne (Reine d.Reineltes)	8	0.097-0.12	340-640	0	0.19				1995/10418 FR8/10/94
				21	< 0.05				
				28	< 0.05				
				35	< 0.05				
Belgium, 1994 3800 St-Truiden Limburg (Elstar)	8	0.097-0.1	290-600	0	0.10				1995/10418 AGR/03/94
				21	< 0.05				
				29	< 0.05				
				35	< 0.05				
Netherlands, 1994 47559 Wykler- Groesbeek Limburg (Jonagold)	8	0.12-0.13	340-710	0	0.20				1995/10418 AGR/04/94
				21	< 0.05				
				28	< 0.05				
				35	< 0.05				
UK, 1994 East Malling Kent (Cox)	8	0.086-0.12	260-650	0	0.41				1995/10418 OAT/01/94
				20	0.11				
				27	0.14				
				34	0.06				
				41	0.06				

APPLE Country, year Location (Variety)	Application			DALA	Residues (mg/kg)				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total	
UK, 1994 Holly Farm, Otham Kent (Bramley)	8	0.094-0.11	280-650	0 21 29 36 42	0.25 < 0.05 0.05 < 0.05 < 0.05				1995/10418 OAT/04/94
UK, 1994 Brenchley Kent (Bramley)	8	0.096-0.11	310-620	0 21 29 36 42	0.24 < 0.05 < 0.05 < 0.05 < 0.05				1995/10418 OAT/05/94
UK, 1994 Gloucestershire (Cox)	8	0.1-0.12	360-600	0 22 28 36 42	0.99 0.23 0.18 < 0.05 0.11				1995/10418 OAT/02/94
UK, 1994 Worcestershire (Cox)	8	0.08-0.11	240-640	0 22 28 36 42	0.41 0.22 0.09 < 0.05 0.05				1995/10418 OAT/03/94
UK, 1994 Cambridgeshire (Bramley)	8	0.098-0.11	290-620	0 20 28 34 42	0.43 0.15 0.06 0.05 < 0.05				1995/10418 OAT/06/94

Table 3 Residues of kresoxim-methyl in pears following eight foliar treatments of kresoxim-methyl (WG formulations)

PEAR Country, year Location (Variety)	Application			DALA	Residues (mg/kg)				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total	
GAP: Netherlands	4	0.1	-	28	7-day minimum retreatment interval				
Spain, 1994 Sevilla 41800 Sanlucar la mayor (Ercolini)	8	0.078-0.11	280-660	0 20 29 36 42	0.11 < 0.05 < 0.05 < 0.05 < 0.05				1995/10418 AC/01/94
Spain, 1994 Huelva (Blanquilla)	8	0.093-0.13	350-620	0 21 29 36 42	0.05 < 0.05 < 0.05 < 0.05 < 0.05				1995/10418 AC/02/94
Spain, 1994 Sevilla 41849 Aznalcazar (Pasacrasana)	8	0.088-0.12	275-560	0 22 28 35 42	0.11 < 0.05 < 0.05 < 0.05 < 0.05				1995/10418 AC/03/94

In field trials on apples and pears, conducted in North America in 1997, four foliar applications of kresoxim-methyl (WG formulations) were applied, about 7 days apart, using tractor-mounted airblast sprayers to apply about 470 litres ('concentrate') or about 2300 litres/ha ('dilute') spray mix/ha. Plot sizes ranged from 48-640 square metres.

Duplicate samples of at least 1.8 kg (or 24 units) whole fruit were frozen within 4 hours of collection and stored for up to 3.5 months before LC-LC-UV analysis using Method BASF No. 350/3 to measure residues of kresoxim-methyl (including metabolite 490M1) and metabolites 490M2 and

490M9. Average recoveries were 87-98% for the three analytes and relative standard deviations (RSD) were < 20 %. The limit of quantitation (LOQ) was 0.05 mg/kg for each analyte.

Table 4 Residues of kresoxim-methyl (including metabolite 490M1) and metabolites 490M2 and 490M9 in apples following four foliar treatments of kresoxim-methyl (WG formulations)

APPLE Country, year Location (Variety)	Application			DALA	Residues mg/kg parent equivalents				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total ^a	
GAP: USA	4	0.22	-	30	7-14 day retreatment interval				
USA, 1997 Yates County, NY (MacIntosh)	4	0.17-0.28	467-473	29	<u>0.081</u>	< 0.05	< 0.05	0.13	1998/5018 RCN 97045 last application 0.23 kg ai/ha
USA, 1997 Wayne County, NY (Northern Spy)	4	0.23	2340-2350	30	<u>< 0.05</u>	0.06	< 0.05	< 0.1	1998/5018 RCN 97046
USA, 1997 Lehigh County, PA (Jonamack)	4	0.23	470-480	30	<u>0.06</u>	< 0.05	< 0.05	0.11	1998/5018 RCN 97047
USA, 1997 Berks County, PA (Star Krimson)	4	0.22-0.23	2300-2350	10 20 30 40 60	0.20 0.09 0.05 <u>0.05</u> < 0.05	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05	0.25 0.14 0.1 0.1 < 0.1	1998/5018 RCN 97048
USA, 1997 Stokes County, NC (Red Delicious)	4	0.22-0.23	460-470	30	<u>0.08</u>	< 0.05	0.05	0.13	1998/5018 RCN 97049
USA, 1997 Carroll County, VA Red)	4	0.22-0.23	2330-2360	30	<u>< 0.05</u>	< 0.05	< 0.05	< 0.1	1998/5018 RCN 97050
USA, 1997 Kent Count, MI (Empire)	4	0.22	470-480	30	<u>0.06</u>	< 0.05	0.06	0.12	1998/5018 RCN 97051
USA, 1997 Ottawa County, MI (Golden Delicious)	4	0.224	2370-2390	30	<u>< 0.05</u>	< 0.05	0.08	0.13	1998/5018 RCN 97052
USA, 1997 Delta County, CO (Red Delicious)	4	0.22-0.23	460-475	31	<u>< 0.05</u>	0.05	< 0.05	< 0.1	1998/5018 RCN 97055
USA, 1997 Cache County, UT (Red Delicious)	4	0.22-0.23	2270-2410	30	<u>0.06</u>	< 0.05	< 0.05	0.11	1998/5018 RCN 97056
USA, 1997 Tulare County, CA (Fuji)	4	0.22-0.23	460-480	30	<u>< 0.05</u>	< 0.05	< 0.05	< 0.1	11998/5018 RCN 97057
USA, 1997 Blatte County, CA (Fuji)	4	0.22-0.23	2330-2390	30	<u>< 0.05</u>	0.06	< 0.05	< 0.1	1998/5018 RCN 97058
USA, 1997 Ephrata Grant County, WA	4	0.22-0.23	465-475	10 20 30 40 60	0.21 0.13 < 0.05 <u>0.05</u> < 0.05	0.05 0.05 0.06 < 0.05 < 0.05	0.06 0.05 < 0.05 < 0.05 < 0.05	0.27 0.18 < 0.1 0.1 < 0.1	1998/5018 RCN 97059
USA, 1997 Royal City Grant County, WA (Red Delicious)	4	0.22	2330-2340	30	<u>< 0.05</u>	< 0.05	< 0.05	< 0.1	1998/5018 RCN 97060
USA, 1997 Fruitland Payette County, ID (Law Rome)	4	0.22-0.23	435-490	30	<u>< 0.05</u>	< 0.05	< 0.05	< 0.1	1998/5018 RCN 97061

APPLE Country, year Location (Variety)	Application			DALA	Residues mg/kg parent equivalents				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total ^a	
USA, 1997 Fruitland Payette County, ID (Red Delicious)	4	0.22-0.23	2285-2330	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5018 RCN 97062
USA, 1997 Menomonie Dunn County, WI (Paula Red)	4	0.22	470-480	30	<u>0.08</u>	< 0.05	< 0.05	0.13	1998/5018 RCN 97053
USA, 1997 Menomonie Dunn County, WI (MacIntosh)	4	0.23	2300-2370	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5018 RCN 97054
USA, 1997 Hood River County, OR (Red Delicious)	4	0.22-0.23	2210-2360	30	<u>0.07</u>	< 0.05	0.05	0.12	1998/5018 RCN 97064

Results are average residues from duplicate samples

^a Sum of kresoxim-methyl (plus 490M1) and metabolite 490M9, expressed as kresoxim-methyl

Table 5 Residues of kresoxim-methyl (including metabolite 490M1) and metabolites 490M2 and 490M9 in pears following four foliar treatments of kresoxim-methyl (WG formulations)

PEAR Country, year Location (Variety)	Application			DALA	Residues mg/kg parent equivalents				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total ^a	
GAP: USA	4	0.22	-	30					
USA, 1997 Lehigh County, PA (Bartlet)	4	0.22-0.24	460-480	31	<u>< 0.05</u>	< 0.05	0.14	0.19	1998/5040 RCN 97072
	4	0.22-0.24	2360-2430	31	< 0.05	< 0.05	0.08	0.13	
USA, 1997 Sacramento County, CA (Bartlet)	4	0.22	465-495	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5040 RCN 97073
	4	0.22	2340-2370	30	<u>< 0.05</u>	< 0.05	0.08	0.13	
USA, 1997 Porterville Tulare County, CA (Bosc)	4	0.22	415-465	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5040 RCN 97074
	4	0.21-0.22	2445-2640	30	<u>0.06</u>	< 0.05	< 0.05	0.11	
USA, 1997 Porterville Tulare County, CA (Tsu-Li)	4	0.22	460-470	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5040 RCN 97075
	4	0.22	2660-2690	30	< 0.05	< 0.05	0.10	0.15	
USA, 1997 Grant County, WA (D'Anjou)	4	0.22	460-475	10	0.12	< 0.05	< 0.05	0.17	1998/5040 RCN 97076
				20	< 0.05	< 0.05	< 0.05	< 0.1	
				30	<u>< 0.05</u>	< 0.05	< 0.05	< 0.1	
				40	< 0.05	< 0.05	< 0.05	< 0.1	
	4	0.22	2310-2335	10	0.16	< 0.05	0.07	0.23	
				20	0.08	< 0.05	0.07	0.15	
				30	< 0.05	< 0.05	< 0.05	< 0.1	
				40	< 0.05	< 0.05	< 0.05	< 0.1	
USA, 1997 Parkdale Hood River County, OR (Red Bartlet)	4	0.21-0.22	455-465	30	< 0.05	< 0.05	0.16	0.21	1998/5040 RCN 97077
	4	0.22-0.24	2310-2350	30	< 0.05	< 0.05	0.12	0.17	
USA, 1997 Hood River Hood River County, OR (Bartlet)	4	0.22-0.24	460-510	29	<u>< 0.05</u>	< 0.05	0.15	0.2	1998/5040 RCN 97184

PEAR Country, year Location (Variety)	Application			DALA	Residues mg/kg parent equivalents				References & Comments
	no	kg ai/ha	water (L/ha)		Kresoxim- methyl	490M2	490M9	Total ^a	
USA, 1997 Payette County, ID (Bartlet)	4	0.22	465-480	30	< 0.05	< 0.05	0.06	0.11	1998/5040 RCN 97078
	4	0.21-0.22	2280-2300	30	< 0.05	< 0.05	< 0.05	< 0.1	
Canada, 1997 Kings County, NS (Clapps Favorite)	4	0.22-0.24	460-475	30	< 0.05	< 0.05	< 0.05	< 0.1	1998/5040 RCN 97115
	4	0.22	2375-2430	30	< 0.05	< 0.05	< 0.05	< 0.1	
Canada, 1997 Brant County, ON (Bosc)	4	0.22-0.24	455-475	29	0.09	< 0.05	< 0.05	0.14	1998/5040 RCN 97116
	4	0.22	2320-2390	29	0.09	< 0.05	< 0.05	0.14	

^a Sum of kresoxim-methyl (plus 490M1) and metabolite 490M9, expressed as kresoxim-methyl

APPRAISAL

Kresoxim-methyl is a strobilurin fungicide, acting by inhibiting mitochondrial respiration.

Kresoxim-methyl was first evaluated for toxicology and residues by JMPR in 1998 and a periodic evaluation was conducted by the 2018 JMPR. An ADI of 0-0.3 mg/kg bw was established and an ARfD was not considered necessary.

For plant commodities, the definition of the residue for compliance with the MRL is: *kresoxim-methyl* and for dietary risk assessment is: *Sum of kresoxim-methyl and metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9) including their conjugates, expressed as kresoxim-methyl*

For animal commodities, the definition of the residue for compliance with the MRL and for dietary risk assessment is: *Sum of metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9), expressed as kresoxim-methyl*

The residue is not fat-soluble.

The 2018 JMPR also noted that if future uses of kresoxim-methyl result in an increase of the dietary exposure to metabolite 490M2, to more than the threshold of toxicological concern (TTC) for a Cramer Class III compound, a reconsideration of the residue definition for dietary exposure may be necessary.

Kresoxim-methyl was scheduled at the Fiftieth Session of the CCPR for evaluation of additional uses by the 2019 JMPR. The Meeting received new GAP information and new supporting residue information for pome fruit.

Results of supervised residue trials on crops

New supervised trials from Canada and the USA were available for the use of kresoxim-methyl on pome fruit. The analytical methods used in these trials were reviewed by the 2018 JMPR and the demonstrated stability of residues in frozen samples (12 months) covered the storage intervals in the trials considered by the Meeting.

Product labels were available from Australia, Belgium, Canada, France, the Netherlands, Spain, the UK and the USA.

For dietary risk assessment, ‘total residues’ refers to the sum of kresoxim-methyl and metabolites 490M1 and 490M9, expressed as kresoxim-methyl. The parent-equivalent conversion factors were 1.047 (490M1) and 0.994 (490M9).

Pome fruit

The critical GAP for kresoxim-methyl on pome fruit is in the USA, with a maximum of 4 foliar applications of 0.22 kg ai/ha, a minimum retreatment interval of 7 days and a pre-harvest interval of 30 days.

In trials from Canada and the USA on apples and pears, matching the GAP in the USA, residues of kresoxim-methyl in apples were: < 0.05 (8), 0.05 (2), 0.06 (3), 0.07 and 0.08 (3) mg/kg (n = 17) and in pears were: < 0.05 (6), 0.06 and 0.09 mg/kg (n = 8).

For maximum residue level estimation, the combined kresoxim-methyl data set for apples and pears, matching the critical GAP for pome fruit in the USA is: < 0.05 (14), 0.05 (2), 0.06 (4), 0.07, 0.08 (3) and 0.09 mg/kg (n = 25).

For dietary risk assessment, total residues (parent, 490M1 and 490M9, expressed as kresoxim-methyl) in apples from trials matching the GAP in the USA were: < 0.1 (7), 0.1 (2), 0.11 (2), 0.12 (2), and 0.13 (4) mg/kg and in pears were: < 0.1 (2), 0.11 (2), 0.13, 0.14, 0.19 and 0.2 mg/kg.

The combined data set for total residues in apples and pears, matching the GAP in the USA is: < 0.1 (9), 0.1 (2), 0.11 (4), 0.12 (2), 0.13 (5), 0.14, 0.19 and 0.2 mg/kg (n = 25).

The Meeting estimated a maximum residue level of 0.15 mg/kg for kresoxim-methyl and an STMR of 0.11 mg/kg for total residues in pome fruit except persimmon, Japanese to replace the previous recommendation for pome fruit.

Fate of residues during processing

The 2018 JMPR reviewed information on the fate of kresoxim-methyl and metabolites 490M1 and 490M9 residues during processing of apples.

Table 1 Processing factors for total residues in apple commodities estimated by the 2018 JMPR for dietary exposure estimation

Raw commodity [STMR]	Processed commodity	Individual processing factors	Mean or best estimate processing factor	STMR-P = STMR _{RAC} × PF (mg/kg)	Median residue = STMR _{RAC} × PF (mg/kg)
Apple [0.11 mg/kg]	Apple sauce	0.23, 0.26, 0.27, 0.29, 0.31, 0.50, 0.63	0.29	0.032	
	Wet pomace	0.31, 0.47, 1.4, 2.1, 2.2, 2.6, 2.7, 4.0	2.2		0.24
	Apple juice	0.10, 0.10, 0.12, 0.13, 0.26, 0.30, 0.31, 0.63	0.2	0.022	
	Dried apples	0.23, 0.30, 0.42, 0.61	0.39	0.043	
	Dried pomace	4.5, 8.7, 9.1, 16	8.9		0.98

Residues in animal commodities

Farm animal dietary burden

Dietary burdens were calculated for beef cattle, dairy cattle, broilers and laying poultry based on feed items evaluated by the JMPR in 2018 and by the current Meeting.

The additional residue burdens arising from the consumption of wet apple pomace do not change the conclusions of the 2018 JMPR. For beef and dairy cattle, the maximum and mean dietary burdens remain at 3.2 ppm and 1.5 ppm, respectively.

Wet apple pomace is not a component of the poultry diets, and maximum and mean dietary burdens for poultry estimated by the 2018 JMPR remain unchanged.

Animal commodity maximum residue levels

The Meeting agreed that since the kresoxim-methyl maximum and mean livestock dietary burdens have not changed, the 2018 JMPR recommendations for animal commodities need not be revised.

RECOMMENDATIONS

On the basis of the data obtained from supervised trials, the Meeting concluded that the residue levels listed below in Table 2 are suitable for establishing maximum residue limits and for IEDI assessments.

Definition of the residue for compliance with the MRL for plant commodities: *Kresoxim-methyl*

Definition of the residue for dietary risk assessment for plant commodities: *Sum of kresoxim-methyl and metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9) including their conjugates, expressed as kresoxim-methyl*

Definition of the residue for compliance with the MRL and dietary risk assessment for animal commodities: *Sum of metabolites (2E)-(methoxyimino){2-[(2-methylphenoxy)methyl]phenyl}acetic acid (490M1), and (2E)-{2-[(4-hydroxy-2-methylphenoxy)methyl]phenyl}(methoxyimino)acetic acid (490M9), expressed as kresoxim-methyl*

The residue is not fat-soluble.

Table 2 Residue levels suitable for establishing maximum residue levels and for dietary exposure

CCN	Commodity	Recommended maximum residue level (mg/kg)		STMR or STMR-P mg/kg
		New	Previous	
FP 0009	Pome fruit	W	0.2	
FP 0009	Pome fruit (except Persimmon, Japanese)	0.15		0.11
	Apple sauce			0.032
JF 0226	Apple juice			0.022
DF 0226	Apples, dried			0.043

Table 3 Additional values used in estimating livestock dietary burdens

CCN	Commodity	Median residue (-P) (mg/kg)	(mg/kg)
	Apple pomace (wet)	0.24	

DIETARY RISK ASSESSMENT

Long-term dietary exposure

The ADI for kresoxim-methyl (and applying to metabolites 490M1 and 490M9) is 0–0.3 mg/kg bw. The International Estimated Daily Intakes (IEDIs) for kresoxim-methyl were estimated for the 17 GEMS/Food Consumption Cluster Diets using the STMR or STMR-P values estimated by the JMPR. The results are shown in Annex 3 of the 2019 JMPR Report.

The IEDIs ranged from 0–0.4% of the maximum ADI. The Meeting concluded that long-term dietary exposure to residues of kresoxim-methyl from uses considered by the JMPR is unlikely to present a public health concern.

Acute dietary exposure

The 2018 JMPR decided that an ARfD for kresoxim-methyl is unnecessary. The Meeting therefore concluded that the acute dietary exposure to residues of kresoxim-methyl from the uses considered is unlikely to present a public health concern.

Threshold of toxicological concern (TTC) consideration for metabolites**Metabolite 490M2**

The 2018 JMPR applied the TTC approach to assess the metabolite 490M2 and concluded that the maximum long-term dietary exposure (0.30 µg/kg bw per day) was below the 1.5 µg/kg bw per day threshold for a Cramer Class III compound.

The current Meeting noted that with the additional residue contribution from the pome fruit commodities considered by the Meeting, the maximum long-term dietary exposure for metabolite 490M2 increased to 0.34 µg/kg bw per day. The Meeting concluded that dietary exposure to residues of 490M2 in food commodities considered by the current and previous Meetings is unlikely to present a public health concern.

REFERENCES

Reference	Author(s)	Year	Title
1998/5018	Wofford T, Movassaghi S, Riley M	1998	Magnitude of kresoxim-methyl residues in apples – 30-day PHI program. BASF Corporation, Agricultural Products Center, Research Triangle Park, NC 27709, United States. 1998/5018. BASF. GLP: Yes. Unpublished
1998/5040	Wofford J.T, Movassaghi S, Riley M.E, Raphiou I	1998	Magnitude of kresoxim-methyl residues in pears for U.S. and Canada – 30-day PHI program. Agricultural Products Center, Research Triangle Park, NC 27709, United States. 1998/5040. GLP: Yes. Unpublished
1995/10418	Fuchs A. Schulz H.	1995	Residue behavior of BAS 490 02 F on pome fruit under field conditions in Germany, France, Spain, Belgium, The Netherlands and Great Britain. Institut Fresenius Chemische und Biologische Laboratorien GmbH, Taunusstein, Germany. 1995/10418. GLP: Yes. Unpublished