METAFLUMIZONE (236)

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EXPLANATION

Metaflumizone is a broad-spectrum semicarbazone insecticide composed of two optical isomers in the ratio E:Z of 90:10. Metaflumizone was first evaluated for residues and toxicology by the JMPR in 2009. An ADI of 0–0.1 mg/kg bw was established and that an ARfD was unnecessary.

The residue definition for compliance with MRLs and dietary risk assessment for plants and animals is: *Metaflumizone, sum of E-isomer and Z-isomer*.

The residue is fat-soluble.

Metaflumizone was scheduled at the Fiftieth Session of the CCPR for evaluation of additional uses for residues by the 2019 Extra JMPR. The Meeting received information from the manufacturer on environmental fate in soil, stability in stored analytical samples, use patterns, supervised residue trials, and the fate of the residues during storage and processing.

Fate and behaviour in the environment

One study on the degradation of metaflumizone under aerobic conditions in Brazilian soil was received (Tornisielo A. 2010, BASF DocID 2018/3001301). [^{14}C]-Metaflumizone (specific activity 6.42 MBq/mg, Radiochemical purity: 97.5%) was applied at a concentration of 0.640 mg/kg, corresponding to the maximum agronomic rate of 240 g ai/ha in four different Brazilian soil types (typical Aluminium-enriched Melanic Gleysol (GM), typical Dystrophic Red Latosol (LVd), Typical Orthic Quartzarenic Neosol (RQ) and chernozemic Eutroferric Red Argisol (PV)).

The treated soils were maintained at 40% of the maximum water holding capacity under dark conditions, at a temperature of 20 ± 2 °C for a period of 118 days. In the periods of 0, 7, 14, 30, 61, 89 and 118 days after treatment (DAT), production of ^{14}CO2, metabolism, bound-residue formation and volatilization of ^{14}C- Metaflumizone (BAS 320 I), were assessed. The microbial activity in the soils (biomass) was checked at 14 and 118 days after application.

The samples were extracted with acetonitrile, followed by a mixture of acetonitrile/water and finally with acetone. The combined and concentrated extracts were resuspended in acetonitrile/water and analysed by Radio-HPLC. The mass balance (extract + non-extractable residue + volatiles) varied between 88.7% and 102.0% of TAR for all soils with mean values between 92.7% and 96.8% of TAR. For all the incubated soils, the extractable radioactivity decreased from 101.3% of TAR at 0 DAT to 40.2% of TAR after 118 days of incubation. The non-extractable radioactivity (bound residue) for all four soils increased from 0.2% of TAR at 0 DAT to 25.7% of TAR after 118 days of incubation. The formation of accumulated CO2 was observed in all four soils reaching maximum values between 10.5 and 29.2% of TAR after 118 days of incubation. The formation of accumulated organic volatile products was observed in the LVd, RQ and PV soils reaching maximum values between 0.1 and 1.5% of TAR after 118 days of incubation.

Table 1 Characteristics of soils used for rate of degradation of ^{14}C-Metaflumizone (BAS 320 I) in Brazilian soils (2018/3001301)

Soil	GM	LVd	RQ	PV
Soil Taxonomy (EUA, 1999)	Humaquept	Hapludox	Quartzipsamment	Mollic Hapludalf
Brazilian System of Soil Classification (Embrapa 2006)	Typic Aluminium-enriched Melanic Gleysol	Typic Dystrophic Red Latosol	Typic Orthic Quartzarenic Neosol	Chernozemic Eutroferric Red Argisol
pH (water)	4.6	4.6	4.8	5.0
Organic carbon (g/kg)	62.8	19.2	6.4	30.8
Nitrogen (mg/kg)	4900	1820	840	2380

Soil	GM	LVd	RQ	PV
Soil Taxonomy (EUA, 1999)	Humaquept	Hapludox	Quartzipsamment	Mollic Hapludalf
Brazilian System of Soil Classification (Embrapa 2006)	Typic Aluminium-enriched Melanic Gleysol	Typic Dystrophic Red Latosol	Typic Orthic Quartzarenic Neosol	Chernozemic Eutroferric Red Argisol
Clay (g/kg)	640	630	80	460
Silt (g/kg)	280	120	20	220
Sand (g/kg)	80	250	900	320
MWHC1/ (g H2O/100g dry soil)	143	62	29	41
Microbial biomass (mg C/ 100 g soil)	185	94	25	136

[a] Maximum Water Holding Capacity

Metaflumizone was found to degrade in the four different Brazilian soils under aerobic conditions with half-lives ranging from 61 days to 205 days. ^{14}C- Metaflumizone (BAS 320 I) dropped from 98.4%, 96.6%, 100.1% and 98.7% of the total applied radioactivity (TAR) at 0 DAT to 53.8%, 35.7%, 67.8% and 56.0% in the GM, LVd, RQ and PV soils, respectively, after 118 days of aerobic incubation. For the GM, RQ and PV soils the maximum quantities of the degradation products M320I04 and M320I23 found during the incubation period were less than 10% of the TAR and for the LVd soil alone the maximum quantities of the degradation products M320I04 and M320I23 found after 118 days of incubation were 20.8% and 5.8% of the TAR, respectively. The half-life of ^{14}C- Metaflumizone (BAS 320 I) was 145 days in the GM soil, 61 days in the LVd soil, 205 days in the RQ soil and 155 days in the PV soil.

Table 2 Recovery and distribution of radioactivity during degradation of ^{14}C-Metaflumizone in GM soil and LVd (2018/3001301)

DAT	GM soil [% TAR]				LVd soil [% TAR]			
	ERR	NER	Volatiles*	Mass Balance	ERR	NER	Volatiles*	Mass Balance
0 (rep 1)	99.2	0.8	n.d.	99.9	101.2	0.6	n.d.	101.8
0 (rep 2)	99.3	0.7	n.d.	100.1	97.7	0.6	n.d.	98.2
0 (mean)	99.2	0.8	n.d.	100.0	99.4	0.6	n.d.	100.0
7	94.4	0.3	1.9	96.6	95.0	0.4	2.0	97.4
14	89.1	3.9	3.8	96.8	82.2	6.5	5.5	94.2
30	83.7	8.6	4.0	96.2	70.3	17.7	13.2	101.2
61 (rep1)	74.7	11.3	5.6	91.6	55.8	20.6	18.6	95.0
61 (rep2)	74.1	10.9	5.5	90.4	55.1	21.3	17.8	94.2
61 (mean)	74.4	11.1	5.5	91.0	55.4	21.0	18.2	94.6
89	69.4	13.9	7.8	91.1	46.1	20.9	23.9	90.9
118 (rep1)	64.6	15.9	10.5	91.0	41.6	25.3	30.7	97.6
118 (rep2)	64.0	16.3	10.5	90.9	40.2	25.7	30.7	96.7
118 (mean)	64.3	16.1	10.5	90.9	40.9	25.5	30.7	97.2

TAR: total applied radioactivity

DAT : days after treatment

ERR : extracted residual radioactivity

NER :non-extractable radioactivity (bound residue)

n.d.: not determined

rep: replicate

*: accumulated values

Table 3 Recovery and distribution of radioactivity during degradation of ^{14}C-Metaflumizone in RQ soil and PV soil (2018/3001301)

DAT	RQ soil [% TAR]				PV soil [% TAR]			
	ERR	NER	Volatiles*	Mass Balance	ERR	NER	Volatiles*	Mass Balance
0 (rep 1)	100.6	0.3	n.d.	100.9	97.2	0.8	n.d.	98.0
0 (rep 2)	98.9	0.2	n.d.	99.1	101.3	0.7	n.d.	102.0
0 (mean)	99.8	0.2	n.d.	100.0	99.3	0.7	n.d.	100.0
7	99.2	0.2	0.0	99.3	93.1	1.1	0.2	94.3
14	93.7	0.4	0.5	94.6	88.6	2.7	0.6	92.0
30	89.2	2.8	4.5	96.5	83.5	7.4	3.4	94.3
61 (rep1)	80.2	2.3	9.4	91.8	74.5	9.3	5.9	89.7
61 (rep2)	79.9	3.3	8.8	92.1	72.8	10.1	6.1	89.0
61 (mean)	80.1	2.8	9.1	92.0	73.6	9.7	6.0	89.3
89	75.3	3.9	12.9	92.0	67.7	12.0	9.4	89.1
118 (rep1)	69.5	13.0	15.5	98.1	59.7	18.3	11.4	89.4
118 (rep2)	69.0	11.9	15.5	96.4	56.9	20.4	11.3	88.7
118 (mean)	69.3	12.4	15.5	97.2	58.3	19.3	11.4	89.0

TAR: total applied radioactivity

DAT : days after treatment

ERR : extracted residual radioactivity

NER :non-extractable radioactivity (bound residue)

n.d.: not determined

rep: replicate

*: accumulated values

Table 4 Biotransformation of ^{14}C-Metaflumizone in soils (2018/3001301)

Day After Treatment	TAR[mg/kg]	%TAR						
		Total Extracted	M 320 I 04 tR ~ 43.8	M 320 I 23 tR ~ 45.0	Metaflumizone			Unknown compound
					(Z-Isomer) tR ~ 58.5	(E-Isomer) tR ~ 61.9	(Z) + (E)	
soil GM, (20 °C)								
0 (rep 1)	0.578	99.2	2.0	-	8.6	88.5	97.2	-
0 (rep 2)		99.3	0.9	-	8.0	90.4	98.4	-
0 (mean)		99.2	1.5	-	8.3	89.4	97.8	-
7		94.4	2.2	-	3.6	88.6	92.2	-
14		89.1	3.5	-	6.9	78.7	85.6	-
30		83.7	3.1	1.1	2.9	76.6	79.5	-
61(rep1)		74.7	5.6	0.3	2.7	66.1	68.8	-
61(rep2)		74.1	6.9	0.2	0.3	66.7	67.0	-
61(mean)		74.4	6.3	0.2	1.5	66.4	67.9	-
89		69.4	4.3	0.5	1.7	62.5	64.1	0.4
118(rep1)		64.6	-	6.4	0.8	56.9	57.8	0.5
118(rep2)		64.0	-	9.5	0.6	53.1	53.8	0.7
118(mean)		64.3	-	8.0	0.7	55.0	55.8	0.6
soil LVd, (20 °C)								
0 (rep 1)	0.590	101.2	4.6	-	9.0	87.6	96.6	-
0 (rep 2)		97.7	4.0	-	8.6	85.0	93.7	-
0 (mean)		99.4	4.3	-	8.8	86.3	95.2	-
7		95.0	3.9	-	2.3	88.8	91.0	-
14		82.2	5.8	-	4.3	72.1	76.4	-
30		70.3	15.8	1.0	0.9	52.7	53.6	-
61(rep1)		55.8	19.7	2.4	0.6	32.4	33.0	0.7
61(rep2)		55.1	20.8	0.6	1.2	32.5	33.7	-
61(mean)		55.4	20.2	1.5	0.9	32.4	33.3	0.3

Day After Treatment	TAR[mg/kg]	%TAR						
		Total Extracted	M 320 I 04 tR ~ 43.8	M 320 I 23 tR ~ 45.0	Metaflumizone			Unknown compound
					(Z-Isomer) tR ~ 58.5	(E-Isomer) tR ~ 61.9	(Z) + (E)	
89		46.1	3.9	1.9	2.7	37.6	40.3	-
118(rep1)		41.6	-	5.8	0.3	35.4	35.7	0.2
118(rep2)		40.2	1.0	1.1	1.3	36.3	37.6	0.6
118(mean)		40.9	0.5	3.4	0.8	35.9	36.6	0.4
soil RQ, (20 °C)								
0 (rep 1)	0.602	100.6	0.6	-	8.0	92.0	100.1	-
0 (rep 2)		98.9	1.5	-	8.2	89.1	97.4	-
0 (mean)		99.8	1.1	-	8.1	90.6	98.7	-
7		99.2	0.6	-	8.0	90.6	98.6	-
14		93.7	0.5	0.4	8.6	84.2	92.8	-
30		89.2	0.4	-	6.6	82.2	88.8	-
61(rep1)		80.2	0.5	0.3	3.0	76.3	79.3	-
61(rep2)		79.9	0.8	0.2	3.4	75.6	79.0	-
61(mean)		80.1	0.7	0.3	3.2	75.9	79.1	-
89		75.3	5.4	0.6	1.3	68.0	69.3	-
118(rep1)		69.5	0.2	0.2	2.3	66.6	68.9	0.3
118(rep2)		69.0	0.6	0.5	0.6	67.3	67.8	0.0
118(mean)		69.3	0.4	0.4	1.4	66.9	68.4	0.1
soil PV, (20 °C)								
0 (rep 1)	0.611	97.2	1.0	-	7.1	89.2	96.3	-
0 (rep 2)		101.3	2.7	-	6.6	92.0	98.7	-
0 (mean)		99.3	1.8	-	6.9	90.6	97.5	-
7		93.1	0.8	-	6.6	84.0	90.6	1.7
14		88.6	2.0	0.3	6.7	79.1	85.7	0.6
30		83.5	-	1.4	4.0	77.6	81.7	0.4
61(rep1)		74.5	1.0	4.2	1.6	66.8	68.4	0.8
61(rep2)		72.8	0.3	1.6	2.8	67.7	70.5	0.3
61(mean)		73.6	0.7	2.9	2.2	67.3	69.5	0.6
89		67.7	-	3.3	2.0	62.4	64.4	-
118(rep1)		59.7	0.2	0.5	0.6	58.5	59.1	-
118(rep2)		56.9	0.2	0.8	0.5	55.4	56.0	-
118(mean)		58.3	0.2	0.6	0.6	56.9	57.5	-

TAR: Total Applied Radioactivity

tR： retention time [min]

rep: replicate

mean: mean of replicate values

-: means no detected peak

Stability of pesticide residues in stored analytical samples

A storage stability study was conducted to determine the stability of metaflumizone residues in cucumber, sunflower seed, snap bean (succulent seed), potato tuber and strawberry plant samples, following field treatment with a 240 g/L SC and, stored under frozen conditions (Stewart J., 2012 a 2010/7013133).

For each crop, one treated plot and one untreated control plot were established. The treated plot received three broadcast applications of metaflumizone at a rate of 1.2 kg ai/ha per application, with a 6–10 day retreatment interval, for an exaggerated total seasonal rate of 3.7 kg ai/ha. The applications were typical foliar sprays except for potato, for which the applications were made to mature tubers placed on the soil surface in order to ensure obtaining residues in the samples. All applications were made in a spray volume of 183–191 L/ha of water, with an adjuvant at a rate targeting 1% v/v in the spray mixture. The crop RAC samples (cucumber (fruit), sunflower (seed), snap bean (succulent seed), potato (tuber), and strawberry (berry) were harvested (by hand) 2 and 7 days after the last application. Duplicate samples were collected from the untreated plot at the sample interval corresponding to 2

DALA, and two independent treated samples were collected from the treated plot at each sampling interval. Each RAC sample was commercially acceptable and weighed a minimum of 0.45 kg. All samples were received frozen from the field and were stored in a freezer (<-5 °C) prior to homogenization and analysis.

The data indicate that residues of metaflumizone are stable at <-5 °C for at least 729 to 971 days (24–32 months) in field-treated cucumber (fruit), sunflower (seed), snap bean (succulent seed), potato (tuber), and strawberry (berry) samples.

Table 5 Storage stability of metaflumizone (E-isomer) in plant matrices

A: in stored samples, % remaining of residues B: procedural, in freshly spiked sample										
	A	B	A	B	A	B	A	B	A	B
Day	Cucumber (fruit)		Sunflower (seed)		Snap bean (succulent seed)		Potato (tuber)		Strawberry (berry)	
0, 2	100	87	100	83	100	87	100	97	100	90
20-66	88	89	-	-	111	114	101	87	99	91
77-91	-	-	74	75	90	87	116	107	77	76
140-210	111	89	85	91	92	89	114	94	85	97
331-417	82	102	94	99	113	106	85	94	92	102
525-545	97	100	-	-	103	98	-	-	98	111
729-971	91	99	86	79	102	98	95	105	84	94

Table 6 Storage stability of metaflumizone (Z-isomer) in plant matrices

A: in stored samples, % remaining of residues B: procedural, in freshly spiked sample										
	A	B	A	B	A	B	A	B	A	B
Day	Cucumber (fruit)		Sunflower (seed)		Snap bean (succulent seed)		Potato (tuber)		Strawberry (berry)	
0, 2	100	84	100	82	100	97	100	91	100	85
20-31	-	-	-	-	101	95	98	98	89	83
40-66	79	91	-	-	-	-	-	-	109	77
77-91	-	-	84	81	90	92	100	91	94	73
140-210	104	87	80	99	90	88	107	94	100	92
331-417	86	98	90	98	89	96	90	99	90	87
525-545	92	103	-	-	90	100	-	-	84	98
729-971	94	102	55	65	88	91	94	88	80	94

Table 7 Storage stability of M320I04 in plant matrices

A: in stored samples, % remaining of residues B: procedural, in freshly spiked sample										
	A	B	A	B	A	B	A	B	A	B
Day	Cucumber (fruit)		Sunflower (seed)		Snap bean (succulent seed)		Potato (tuber)		Strawberry (berry)	
0, 2	100	80	100	62	100	94	100	86	100	84
20-31	-	-	-	-	-	78	71	88	126	82
34	-	-	-	-	-	-	-	-	182	65
40-66	-	73	-	-	-	-	-	-	168	73
77-91	-	-	-	91	-	71	69	105	182	86
140-207	-	95	-	108	-	106	93	86	227	82
210	-	-	-	-	-	-	-	-	172	87
331-417	-	97	-	93	-	81	82	82	161	81
525-545	-	99	-	-	-	81	-	-	223	86

A: in stored samples, % remaining of residues B: procedural, in freshly spiked sample										
	A	B	A	B	A	B	A	B	A	B
Day	Cucumber (fruit)		Sunflower (seed)		Snap bean (succulent seed)		Potato (tuber)		Strawberry (berry)	
729-971	-	94	-	75	-	91	88	88	214	88

Table 8 Storage stability of M320I23 in plant matrices

A: in stored samples, % remaining of residues B: procedural, in freshly spiked sample										
	A	B	A	B	A	B	A	B	A	B
Day	Cucumber (fruit)		Sunflower (seed)		Snap bean (succulent seed)		Potato (tuber)		Strawberry (berry)	
0, 2	100	107	100	84	100	111	100	96	100	92
20-31	-	-	-	-	-	89	117	98	-	88
34	-	-	-	-	-	-	-	-	-	67
40-66	-	97	-	-	-	-	-	-	-	97
77-91	-	-	-	86	-	103	138	118	-	81
140-210	-	-	-	83	-	124	102	103	-	89
331-417	-	107	-	105	-	100	82	109	-	90
525-545	-	100	-	-	-	92	-	-	-	100
729-971	-	94	-	116	-	107	86	95	-	96

USE PATTERN

Metaflumizone is registered in many countries for use in fruits, vegetables, cereals and tree nuts. The information considered by the Meeting on registered uses is summarized in Table 9.

Table 9 Registered uses of metaflumizone

Crop	Country	Formulation		Application				PHI (day)	Remarks
		g ai/L	type	Method	Rate (kg ai/ha)	Appl. interval	No. per season		
Citrus fruits (Group 001)									
Citrus fruits FC 0001	Brazil	240	CS	spraying	0.384-0.48	7 days	3	7	Water volume 2000L/ha
Pome fruits (Group 002)									
Apple FP 0226	Brazil	240	CS	spraying	0.192-0.24	7 days	4	3	Water volume 1000L/ha
Apple FP 0226	Korea	240	CS	spraying	0.16-0.32	10 days	3	14	Water volume 1-2000L/ha
Other small fruited berries (Subgroup 004C)									
Grape FB 0269	Brazil	240	CS	spraying	0.144-0.24	7 days	3	3	Water volume 1000L/ha
Cucurbit-inedible peel (Subgroup 011B)									
Melon, except watermelon VC0046	Brazil	240	CS	spraying	0.154-0.192	7 days	5	3	Water volume 800L/ha
Watermelon VC0432	Brazil	240	CS	spraying	0.154-0.192	7 days	5	3	Water volume 800L/ha
Pulses (Subgroup 015)									
Soybean VD 0541	Brazil	240	CS	spraying	0.192-0.24	7 days	3	14	Water volume 200L/ha
Cereal grains (Subgroup 020)									
Maize GC 0645	Brazil	240	CS	spraying	0.12-0.24	7 days	5	14	Water volume 200L/ha
Grasses for sugar or syrup production (Subgroup 021)									
Sugarcane GS 0659	Brazil	240	CS	In furrow at planting	0.192-0.24	Not applicable	1	Not defined (due to mode of application)	Water volume 200L/ha
Seed for beverage and sweet (Subgroup 024)									
Coffee beans SB0716	Brazil	240	CS	spraying	0.36-0.48	30 days	2	45	Water volume 200-400L/ha

RESULTS OF SUPERVISED RESIDUE TRIALS ON CROPS

Supervised trials were provided to support the estimation of maximum residue levels for metaflumizone when used for foliar application on citrus fruits, apple, grape, melon, watermelon, maize, soya bean and coffee, and as a furrow use in sugarcane.

Supervised field trials were conducted in Brazil. Each trial consisted of one treated and one control plot. A metaflumizone 240 g/L SC formulation was used for the foliar applications. All samples were stored at -20°C for periods less than the intervals of demonstrated storage stability for metaflumizone E-isomer and metaflumizone Z-isomer. The residues of metaflumizone E-isomer and

Z-isomer were determined using LC-MS/MS with method BASF 531/1. The method was previously reviewed as suitable for all commodities with LOQs of 0.01 mg/kg for each analyte.

Citrus fruits

The field trials were conducted on citrus fruits (orange and lemon) in Brazil during the 2012 and 2013 growing season. Each trial consisted of one treated and one control plot. Metaflumizone 240 g/L SC formulation was foliar applied three times at rates of 0.48 kg ai/ha in spray volumes of 2000 L/ha. Control and treated samples were harvested 7 days after the last treatment (DALA) for the harvest trials and at 0, 7, 14 and 21 DALA in the decline trials. Samples were kept at -20 °C until analysis. All orange and lemon samples were stored for less than 395 days. The residues of metaflumizone E-isomer and Z-isomer in citrus fruits were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Oranges

Table 10 Residues of metaflumizone in orange after foliar application of 240g /L SC

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			Study Reference
	Method	No (int, days)	Rate kg ai/ha	DALA		E-isomer	Z-isomer	Total	
Brazil, 2011, Sao Paulo Aguai, Natal, G100279	foliar	3 (10,9)	0.48	0	Whole Fruit	0.83	0.86	1.69	2012/3003761
				7	Whole Fruit	0.49	0.86	1.35	
				14	Whole Fruit	0.41	0.69	1.1	
0Brazil, 2011, Sao Paulo Santo Antonio de Posse, Pera-coroa, G100679	foliar	3 (10,9)	0.48	0	Whole Fruit	0.62	0.47	1.09	2012/3003761
				7	Whole Fruit	0.43	0.58	1.01	
				14	Whole Fruit	0.29	0.45	0.74	
Brazil, 2011, Parana Londrina, Pera-Rio, G100680	foliar	3 (11,10)	0.48	7	Whole Fruit	0.32	0.34	0.66	2012/3003761
Brazil, 2011, Sao Paulo Jaboticabal, Pera, G100681	foliar	3 (10,11)	0.48	7	Whole Fruit	0.08	0.14	0.22	2012/3003761
Brazil, 2012, Sao Paulo Santo Antonio de Posse, Hamelin, G110286	foliar	3 (13,7)	0.12	0	Whole Fruit	0.18	0.26	0.44	2014/3000341
				7	Whole Fruit	0.12	0.25	0.37	
				14	Whole Fruit	<0.01	<0.01	<0.02	
				21	Whole Fruit	0.06	0.13	0.19	
Brazil, 2012, Sao Paulo Santo Antonio de Posse, Hamelin, G110286	foliar	3 (10,11)	0.12	7	Peel Pulp	0.6 <0.01	1.66 <0.01	2.26 <0.02	2014/3000341
Brazil, 2012, Sao Paulo Jaboticabal, Pera, G110287	foliar	3 (11,10)	0.48	0	Whole Fruit	0.18	0.36	0.53	2014/3000341
				7	Whole Fruit	0.12	0.3	0.42	
				14	Whole Fruit	0.09	0.29	0.38	
				21	Whole Fruit	0.09	0.25	0.34	

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			Study Reference
	Method	No (int, days)	Rate kg ai/ha	DALA		E-isomer	Z-isomer	Total	
Brazil, 2012, Sao Paulo Jaboticabal, Pera, G110287	foliar	3 (9,11)	0.48	7	Peel Pulp	0.79 <0.01	2.34 0.02	3.13 <0.03	2014/3000341
Brazil, 2012, Sao Paulo Aguai, Westin, G110288	foliar	3 (9,11)	0.48	7	Whole Fruit	0.35	0.86	1.21	2014/3000341
Brazil, 2013, Parana Tamarana, Pera Rio, G110292	foliar	3 (10,10)	0.48	7	Whole Fruit	0.32	0.52	0.84	2014/3000341
Brazil, 2013, Parana Londrina, Pera Rio, G110293	foliar	3 (10,9)	0.48	7	Whole Fruit	0.17	0.25	0.42	2014/3000341
Brazil, 2012, Sao Paulo Rio Claro, Laranja Pera, G110294	foliar	3 (10,8)	0.48	7	Whole Fruit	0.24	0.47	0.71	2014/3000341
Brazil, 2013, Parana Jataizinho, Pera Rio, G110295	foliar	3 (10,10)	0.48	7	Whole Fruit Peel Pulp	0.09 0.62 <0.01	0.13 0.96 <0.01	0.22 1.58 <0.02	2014/3000341
Brazil, 2013, Sao Paulo Mogi Mirim, Pera Coroa, G110355	foliar	3 (10,9)	0.48	0	Whole Fruit	0.27	0.24	0.51	2014/3000341
				7	Whole Fruit	0.08	0.13	0.21	
				14	Whole Fruit	0.13	0.21	0.34	
				21	Whole Fruit	0.1	0.13	0.23	

Lemon

Table 11 Residues of metaflumizone in lemon after foliar application of a 240 g /L SC formulation

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			Study Reference
	Method	No (Int, days)	Rate kg ai/ha	DALA		E-ISOMER	Z-ISOMER	Total	
Brazil, 2012, Sao Paulo Limeira, Tahiti, G110289	foliar	3 (9,11))	0.48	0	Whole Fruit	0.19	0.11	0.3	2014/3000341
				7	Whole Fruit	0.06	0.11	0.17	
				14	Whole Fruit	0.06	0.16	0.22	
				21	Whole Fruit	0.09	0.21	0.3	
Brazil, 2013, Parana Cambe, Tahiti, G110290	foliar	3 (10,10)	0.48	0	Whole Fruit	0.11	0.07	0.18	2014/3000341
				7	Whole Fruit	0.11	0.14	0.25	
				14	Whole Fruit	0.1	0.15	0.25	
				21	Whole Fruit	0.11	0.16	0.27	
	foliar	3	0.48	0	Whole Fruit	0.35	0.19	0.54	2014/3000341

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			Study Reference
	Method	No (Int, days)	Rate kg ai/ha	DALA		E-ISOMER	Z-ISOMER	Total	
Brazil, 2013, Parana Cornelio Procopio, Tahiti, G110291		(10,10)		7	Whole Fruit	0.19	0.22	0.41	
				14	Whole Fruit	0.21	0.31	0.52	
				21	Whole Fruit	0.08	0.1	0.18	
Brazil, 2012, Sao Paulo Itapolis, Tahiti, G110296	foliar	3 (10,10)	0.48	7	Whole Fruit Peel Pulp	0.32 1.06 0.04	0.59 2.35 0.05	0.91 3.41 0.09	2014/3000341
Brazil, 2012, Sao Paulo Pirangi, Tahiti, G110297	foliar	3 (10,10)	0.48	7	Whole Fruit Peel Pulp	0.35 1.03 0.01	0.71 2.84 0.02	1.06 3.87 0.03	2014/3000341

Pome fruits

Apple

The field trials were conducted on apple in Brazil during the 2012 and 2013 growing season. Each trial consisted of one treated and one control plot. Metaflumizone 240 g/L SC formulation was foliar applied four times at rates of 0.24 kg ai/ha in spray volumes of 1000 L/ha. Control and treated samples were harvested at 3 DALA and additionally at 0, 1, 7 and 10 DALA in the decline trials. Samples were kept at or below -20°C until analysis. The apple samples were stored for up to 351 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in apple were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 12 Residues of metaflumizone in apple after foliar application of a 240g /L SC formulation

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			
	Method	No (int. days)	Rate kg ai/ha	DALA		E-ISOMER	Z-ISOMER	Total	Study Reference
Brazil, 2009, Parana, Campo do Tenente, Imperial Gala, G090291	foliar	4 (7,7,7)	0.24	0	whole fruit	0.18	0.17	0.35	2013/1043077
				1	whole fruit	0.13	0.19	0.32	
				3	whole fruit	0.13	0.2	0.33	
				7	whole fruit	0.1	0.15	0.25	
				10	whole fruit	0.06	0.1	0.16	
Brazil, 2009, Parana, Ponto Amazonas, Gala Royall, G090292	foliar	4 (7,7,7)	0.24	0	whole fruit	0.17	0.17	0.34	2013/1043077
				1	whole fruit	0.17	0.21	0.38	
				3	whole fruit	0.11	0.19	0.3	
				7	whole fruit	0.09	0.16	0.25	
				10	whole fruit	0.06	0.09	0.15	
Brazil, 2009, Santa Catarina, Farburgo, Max Gala, G090293	foliar	4 (7,7,8)	0.24	3	whole fruit	0.1	0.14	0.24	2013/1043077

Country, Year, Location, Variety, Trial No.	Application				Portion analysed	Residue mg/kg			
	Method	No (int. days)	Rate kg ai/ha	DALA		E-ISOMER	Z-ISOMER	Total	Study Reference
Brazil, 2010, Santa Catarina, São Joaquim, Fugi, G090434	foliar	4 (7,7,7)	0.24	3	whole fruit	0.09	0.16	0.25	2013/1043077
Brazil, 2011, Parana, Campo Tenente, Gala, G110160	foliar	4 (7,7,7)	0.24	0	whole fruit	0.1	0.11	0.21	2013/3012922
				1	whole fruit	0.07	0.09	0.16	
				3	whole fruit	0.06	0.1	0.16	
				7	whole fruit	0.03	0.06	0.09	
				10	whole fruit	0.02	0.04	0.06	
Brazil, 2011, Santa Catarina, Fraiburgo, Gala, G110161	foliar	4 (7,7,7)	0.24	3	whole fruit	0.07	0.12	0.19	2013/3012922
Brazil, 2012, Parana, Guaragi, Eva, G110335	foliar	4 (7,7,7)	0.24	0	whole fruit	0.14	0.12	0.26	2013/3012922
				1	whole fruit	0.09	0.15	0.24	
				3	whole fruit	0.06	0.11	0.17	
				7	whole fruit	0.06	0.1	0.16	
				10	whole fruit	0.05	0.09	0.14	
Brazil, 2012, Parana, Urai, Eva, G110336	foliar	4 (7,7,7)	0.24	0	whole fruit	0.29	0.27	0.56	2013/3012922
				1	whole fruit	0.23	0.3	0.53	
				3	whole fruit	0.15	0.28	0.43	
				7	whole fruit	0.08	0.15	0.23	
				10	whole fruit	0.07	0.14	0.21	
Brazil, 2012, Parana, Campo Tenente, Gala, G110337	foliar	4 (7,7,7)	0.24	3	whole fruit	0.09	0.13	0.22	2013/3012922
Brazil, 2012, Santa Catarina, Fraiburgo, Gala, G110338	foliar	4 (7,7,7)	0.24	3	whole fruit	0.22	0.32	0.54	2013/3012922
Brazil, 2012, Parana, Ibipora, Eva, G110339	foliar	4 (7,7,7)	0.24	3	whole fruit	0.17	0.31	0.48	2013/3012922
Brazil, 2012, Santa Catarina, Sao Joaquim, Fuji, G110351	foliar	4 (8,8,6)	0.24	0	whole fruit	0.24	0.26	0.5	2013/3012922
				1	whole fruit	0.22	0.21	0.43	
				3	whole fruit	0.16	0.36	0.52	
				7	whole fruit	0.08	0.21	0.29	
				10	whole fruit	0.1	0.24	0.34	

Grape

The field trials were conducted on grapes in Brazil during the 2011 and 2012 growing seasons. Each trial consisted of one treated and one control plot. Three foliar applications of a metaflumizone 240 g/L SC formulation were made at rates of 0.24 kg ai/ha in spray volumes of 1000 L/ha. Control and treated samples were harvested at 3 DALA and additionally at 0, 7, 14 and 21 DALA in the decline trials. Samples were kept at or below -20 °C until analysis. Grape samples were stored for up to 450 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in grapes were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 13 Residues of metaflumizone in grapes after foliar application of a 240g /L SC formulation

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	Study Reference
Brazil, 2010, Parana, Ponta Grossa, Niagara Branca, G100206	foliar	3 (7,7)	0.24	0	fruit	1.15	0.78	1.93	2012/3003762
				3	fruit	0.64	0.76	1.4	
				7	fruit	0.55	0.76	1.31	
Brazil, 2011, Parana, Londrina, Benitaka, G100207	foliar	3 (7,7)	0.24	0	fruit	0.98	0.57	1.55	2012/3003762
				3	fruit	0.73	0.72	1.45	
				7	fruit	0.83	0.89	1.72	
Brazil, 2010, Santa Catarina, Videira, Italia, G100208	foliar	3 (7,8)	0.24	3	fruit	0.3	0.33	0.63	2012/3003762
Brazil, 2011, Sao Paulo, Jundiai, Niagara Rosada, G100209	foliar	3 (7,8)	0.24	3	fruit	0.12	0.15	0.27	2012/3003762
Brazil, 2011, Parana, Ponta Grossa, Niagara Branca, G110162	foliar	3 (8,6)	0.24	0	fruit	1.76	0.89	2.65	2013/3014221
				3	fruit	1.47	1.24	2.71	
				7	fruit	1.04	1.2	2.24	
				14	fruit	0.81	1.14	1.95	
				21	fruit	0.71	1.1	1.81	
Brazil, 2011, Sao Paulo, Jundiai, Niagara Rosada, G110163	foliar	3 (7,7)	0.24	0	fruit	0.47	0.29	0.76	2013/3014221
				3	fruit	0.23	0.28	0.51	
				7	fruit	0.2	0.23	0.43	
				14	fruit	0.15	0.18	0.33	
				21	fruit	0.18	0.26	0.44	
Brazil, 2012, Pernambuco, Petrolina, Italia, G110164	foliar	3 (7,7)	0.24	3	fruit	0.58	0.81	1.39	2013/3014221
Brazil, 2012, Parana, Rolandia, Benitaka, G110329	foliar	3 (7,7)	0.24	0	fruit	0.62	0.39	1.01	2013/3014221
				3	fruit	0.38	0.38	0.76	
				7	fruit	0.56	0.65	1.21	
				14	fruit	0.3	0.57	0.87	

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	Study Reference
				21	fruit	0.19	0.29	0.48	
Brazil, 2012, Sao Paulo, Taiacu, Niagara Rosada, G110330	foliar	3 (7,7)	0.24	0	fruit	1.16	0.66	1.82	2013/3014221
				3	fruit	1.08	0.76	1.84	
				7	fruit	0.71	0.74	1.45	
				14	fruit	0.75	0.91	1.66	
				21	fruit	0.46	0.61	1.07	
Brazil, 2012, Parana, Urai, Rubi, G110331	foliar	3 (7,7)	0.24	3	fruit	0.38	0.37	0.75	2013/3014221
Brazil, 2012, Parana, Cambe, Niagara, G110332	foliar	3 (7,7)	0.24	3	fruit	0.08	0.07	0.15	2013/3014221
Brazil, 2012, Sao Paulo, Indaiatuba, Niagara, G110333	foliar	3 (7,7)	0.24	3	fruit	0.35	0.29	0.64	2013/3014221

Melon

The field trials were conducted on melons in Brazil during the 2012 and 2013 growing seasons. Five foliar applications of a metaflumizone 240 g/L SC were made at rates of 0.24 kg ai/ha, in spray volumes of 1000 L/ha. Control and treated samples were harvested at 3 DALA and additionally at 0, 1, 7 and 10 DALA in decline trials. For the 3 DALA samples, the fruits were cut in longitudinal and transverse sections, and the two equidistant sides were sampled as whole fruit and the remaining two sides were sampled as peel and pulp. All samples were double bagged and placed in a freezer on the date of collection. Samples were kept at or below -20 °C until analysis. Melon samples were stored for up to 299 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in melon were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 14 Residues of metaflumizone in melon after foliar application of a 240g /L SC formulation

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int, days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2011, Parana, Ibipora, Louis, G090307	foliar	5 (7,7,7,7)	0.192	0	Whole fruit	0.11	0.1	0.21	2012/3003764
				1	Whole fruit	0.13	0.14	0.27	
				3	Whole fruit	0.06	0.08	0.14	
				7	Whole fruit	0.02	0.03	0.05	
				10	Whole fruit	0.04	0.05	0.09	
Brazil, 2010, Goias, Senador Canedo,	foliar	5 (7,7,7,7)	0.24	0	Whole fruit	0.04	0.08	0.12	2012/3003764
				1	Whole fruit	0.04	0.07	0.11	
				3	Whole fruit	0.03	0.07	0.1	

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int, days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Gaucho, G090308				7	Whole fruit	0.01	0.03	0.04	
				10	Whole fruit	<0.01	0.02	<0.03	
Brazil, 2010, Sao Paulo, Santo Antonio de Posse, Sunrise, G090309	foliar	5 (7,7,7,7)	0.24	3	Whole fruit	0.11	0.18	0.29	2012/3003764
Brazil, 2010, Rio Grande do Norte, Mossoro, Colderx, G090310	foliar	5 (7,7,7,7)	0.24	3	Whole fruit	0.03	0.04	0.07	2012/3003764
Brazil, 2011, Parana, Londrina, Louis, G090311	foliar	5 (7,7,7,7)	0.24	3	Whole fruit	0.28	0.33	0.61	2012/3003764
Brazil, 2012, Pernambuco, Petrolina, Amarelo, G120078	foliar	5 (7,8,6,7)	0.24	0	Whole fruit	0.02	0.02	0.04	2013/3014222
				1	Whole fruit	0.01	0.02	0.03	
				3	Whole fruit	<0.01	<0.01	<0.02	
				7	Whole fruit	<0.01	<0.01	<0.02	
				10	Whole fruit	<0.01	<0.01	<0.02	
Brazil, 2012, Pernambuco, Petrolina, Amarelo, G120078	foliar	5 (7,8,6,7)	0.24	3	Peel Pulp	0.02 <0.01	0.06 <0.01	0.08 <0.02	2013/3014222
Brazil, 2012, Pernambuco, Assai, Louis, G120080	foliar	5 (7,7,7,7)	0.24	0	Whole fruit	0.12	0.12	0.24	2013/3014222
				1	Whole fruit	0.09	0.12	0.21	
				3	Whole fruit	0.08	0.12	0.2	
				7	Whole fruit	0.06	0.11	0.17	
				10	Whole fruit	0.07	0.12	0.19	
Brazil, 2012, Pernambuco, Assai, Louis, G120080	foliar	5 (7,7,7,7)	0.24	3	Peel Pulp	0.29 <0.01	0.6 <0.01	0.89 <0.02	2013/3014222
Brazil, 2012, Bahia, Sobradinho, Pele de Sapo, G120081	foliar	5 (7,7,7,7)	0.24	3	Peel Pulp Whole Fruit	0.02 <0.01 <0.01	0.02 <0.01 <0.01	0.04 <0.02 <0.02	2013/3014222

Soya bean

The field trials were conducted on soya bean in Brazil during the 2010 and 2011 growing seasons. Each trial consisted of one treated and one control plot. Three foliar applications of a metaflumizone 240 g/L SC were made at rates of 0.24 kg ai/ha in spray volumes of 200 L/ha. Control and treated soya bean seed were harvested at 14 DALA (BBCH 83–89) and additionally at 0, 7 and 21 DALA in decline trials. Samples were kept at or below -20 °C until analysis. Soya bean grain samples were stored for up to 365 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in soya bean were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 15 Residues of metaflumizone in soya bean seeds after foliar application of a 240 g/L SC formulation

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2010, Sao Paulo, Santo Antonio de Pesse, Monsoy, G090261	foliar	3 (9,11)	0.24	0	Seed	0.13	0.15	0.28	2013/1043078
				6	Seed	0.07	0.09	0.16	
				14	Seed	0.03	0.04	0.07	
				21	Seed	0.01	0.02	0.03	
				28	Seed	0.02	0.02	0.04	
Brazil, 2010, Parana, Ponta Grossa, BRS-232, G090262	foliar	3 (10,10)	0.24	0	Seed	0.02	0.02	0.04	2013/1043078
				7	Seed	<0.01	<0.01	<0.02	
				14	Seed	<0.01	<0.01	<0.02	
				21	Seed	<0.01	<0.01	<0.02	
				28	Seed	<0.01	<0.01	<0.02	
Brazil, 2010, Goias, Ardpolis, M-SOY RR 7908, G090263	foliar	3 (10,9)	0.24	14	Seed	<0.01	0.01	0.02	2013/1043078
Brazil, 2010, Goias, Senader Canedo, M-SOY RR 7908, G090264	foliar	3 (10,10)	0.24	14	Seed	<0.01	0.02	0.03	2013/1043078
Brazil, 2011, Parana, Ponta Grossa, Innox, G100563	foliar	3 (9,10)	0.24	0	Seed	0.03	0.04	0.07	2014/3002726
				7	Seed	0.02	0.03	0.05	
				14	Seed	<0.01	0.01	0.02	
				21	Seed	<0.01	<0.01	<0.02	
Brazil, 2010, Goias, Senador Canedo, BRSGO7560, G100564	foliar	3 (9,10)	0.24	0	Seed	0.06	0.05	0.11	2014/3002726
				7	Seed	0.02	0.02	0.04	
				14	Seed	<0.01	<0.01	<0.02	
				21	Seed	<0.01	<0.01	<0.02	
Brazil, 2011, Goias, Anapolis, BRSGO7560, G100565	foliar	3 (6,10)	0.24	14	Seed	<0.01	<0.01	<0.02	2014/3002726

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2011, Sao Paulo, Santo Antonio de Posse, Innox, G100566	foliar	3 (10,10)	0.24	14	Seed	0.03	0.08	0.11	2014/3002726

Cereal Grain

Maize (field)

The field trials were conducted on maize in Brazil during the 2010 and 2011 growing seasons. Each trial consisted of one treated and one control plot. Five foliar applications of a metaflumizone 240 g/L SC were made at rates of 0.24 kg ai/ha in spray volumes of 300 L/ha. Control and treated samples were harvested at 14 DALA and additionally at 0, 7 and 21 DALA in decline trials. Samples were kept at or below -20 °C until analysis. Maize grain samples were stored for up to 160 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in maize were determined using a modified version of LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 16 Residues of metaflumizone in maize grains after foliar application of a 240g /L SC formulation

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2010, Sao Paulo, Santo Antonio de Posse, Ag 700 Gieldgard, G090273	foliar	5 (7,8,6,7)	0.24	0	Grain	<0.01	<0.01	<0.02	2012/3003401
				7	Grain	<0.01	<0.01	<0.02	
				14	Grain	<0.01	<0.01	<0.02	
				21	Grain	<0.01	<0.01	<0.02	
				28	Grain	<0.01	<0.01	<0.02	
Brazil, 2010, Parana, Ponta Grossa, 2A 120, G090274	foliar	5 (7,7,7,7)	0.24	0	Grain	<0.01	<0.01	<0.02	2012/3003401
				7	Grain	<0.01	<0.01	<0.02	
				14	Grain	<0.01	<0.01	<0.02	
				21	Grain	<0.01	<0.01	<0.02	
				28	Grain	<0.01	<0.01	<0.02	
Brazil, 2010, Goias, Senador Canedo , Engopa 501, G090275	foliar	5 (7,7,7,8)	0.24	14	Grain	<0.01	<0.01	<0.02	2012/3003401
Brazil, 2010, Goias, Anapolis , BRS 1030, G090276	foliar	5 (7,7,7,7)	0.24	14	Grain	<0.01	<0.01	<0.02	2012/3003401
Brazil, 2011, Goias, Senador Canedo, Yielogard, G100567	foliar	5 (7,7,7,6)	0.24	0	Grain	<0.01	<0.01	<0.02	2012/3003763
				7	Grain	<0.01	<0.01	<0.02	
				14	Grain	<0.01	<0.01	<0.02	
				21	Grain	<0.01	<0.01	<0.02	

CROP, Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int. days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2011, Sao Paulo, Santo Antonio de Posse, Dow 2B710CL, G100568	foliar	5 (7,7,7,6)	0.24	14	Grain	<0.01	<0.01	<0.02	2012/3003763
Brazil, 2011, Parana, Cambe, Cargo, G100677	foliar	5 (7,7,7,7)	0.24	0	Grain	0.06	<0.01	0.07	2012/3003763
				7	Grain	0.04	<0.01	0.05	
				14	Grain	0.01	<0.01	0.02	
				21	Grain	<0.01	<0.01	<0.02	
Brazil, 2011, Parana, Ibipora, Cargo, G100678	foliar	5 (7,7,7,7)	0.24	14	Grain	<0.01	<0.01	<0.02	2012/3003763

Sugarcane

Field trials on sugar cane were conducted in Brazil during the 2012 and 2013 growing seasons. Each trial consisted of one treated and one control plot. A metaflumizone 240 g/L SC was applied once in-furrow at a rate of 1.2 kg ai/ha (5 times the label rate) in a spray volume of 150 L/ha. Control and treated samples were harvested at 500, 510 and 520 DALA in decline trials. In the other trials, the sample timing was not defined due to the application mode. Samples were kept at or below -20°C until analysis. Sugar cane samples were stored for up to 256 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in sugar cane were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 17 Residues of metaflumizone in sugar cane after foliar application of a 240 g/L SC formulation

Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2008, Sao Paulo, Santo Antonio de Posse, SP 801816, G080385	in furrow	1	1.2	302	Stalks	<0.01	<0.01	<0.02	2013/1043079
Brazil, 2009, Minas Gerais, Uberlandia, G080386	in furrow	1	1.2	301	Stalks	<0.01	<0.01	<0.02	2013/1043079
Brazil, 2012, Sao Paulo, Jaboticabal, IAC-SP955094, G110266	in furrow	1	1.2	500	Stalks	<0.01	<0.01	<0.02	2014/3000342
				510	Stalks	<0.01	<0.01	<0.02	
				520	Stalks	<0.01	<0.01	<0.02	

Country, Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2012, Goias, Senador Canedo, RB867515, G110344	in furrow	1	1.2	449	Stalks	<0.01	<0.01	<0.02	2014/3000342
Brazil, 2012, Minas Gerais, Uberlandia, RB867515, G110345	in furrow	1	1.2	464	Stalks	<0.01	<0.01	<0.02	2014/3000342
Brazil, 2012, Sao Paulo, Santo Antonio de Posse, SP801816, G110346	in furrow	1	1.03	500	Stalks	<0.01	<0.01	<0.02	2014/3000342
				510	Stalks	<0.01	<0.01	<0.02	
				520	Stalks	<0.01	<0.01	<0.02	

Coffee

Field trials were conducted on coffee beans in Brazil during the 2014 and 2016 growing seasons. Each trial consisted of one control and eight treated plots. Metaflumizone 240 g/L SC was applied twice as a foliar spray at rates of 0.36 kg ai/ha and 0.48 kg ai/ha in spray volumes of 400 L/ha. Control and treated samples were harvested at 45, 60, 75 and 90 DALA. The cherry coffee was sampled by hand, and dried in the field processing shed at ambient temperatures. After drying, the coffee cherries passed through the pulping process, with the aid of a manual pulper, in order to separate the grains (beans) from the husk. Samples were kept at or below -20 °C until analysis. Coffee bean samples were stored for up to 174 days prior to analysis. The residues of metaflumizone E-isomer and Z-isomer in coffee beans were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte.

Table 18 Residues of metaflumizone in coffee bean after foliar application of a 240g /L SC formulation

Year, Location, Variety, Trial No.	Application			DALA	Portion analysed	Residue mg/kg			Study Reference
	Method	No (int.days)	Rate kg ai/ha			E-ISOMER	Z-ISOMER	Total	
Brazil, 2014, Sao Paulo, Santo Antônio do Jardim, Obatã, G130169	foliar	2 (42)	0.48	0	Bean	0.05	0.08	0.13	2014/3021341
				44	Bean	0.02	0.06	0.08	
				60	Bean	0.03	0.06	0.09	
				75	Bean	0.02	0.05	0.07	
				90	Bean	0.02	0.03	0.05	
Brazil, 2014, Parana, Jaguapitã, Tupi, G130170	foliar	2 (30)	0.48	0	Bean	<0.01	<0.01	<0.02	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Minas Gerais, Araguari,	foliar	2 (31)	0.48	0	Bean	<0.01	0.02	<0.03	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	

Year, Location, Variety, Trial No.	Application					Residue mg/kg			
	Method	No (int.days)	Rate kg ai/ha	DALA	Portion analysed	E-ISOMER	Z-ISOMER	Total	Study Reference
Catuaí, G130171				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Minas Gerais, Indianápolis, Catuaí, G130172	foliar	2 (31)	0.48	0	Bean	0.01	0.02	0.03	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Parana, Cambé, IPR 103, G130173	foliar	2 (30)	0.48	0	Bean	0.04	0.05	0.09	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Minas Gerais, Iraí de Minas, IAPAR 59, G130243	foliar	2 (30)	0.24	0	Bean	<0.01	0.01	0.02	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Minas Gerais, Iraí de Minas, IAPAR 59, G130243	foliar	2 (30)	0.36	0	Bean	0.02	0.04	0.06	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	0.01	0.02	
				90	Bean	<0.01	0.01	0.02	
Brazil, 2014, Minas Gerais, Araguari, Mundo Novo, G130244	foliar	2 (30)	0.24	0	Bean	0.03	0.06	0.09	2014/3021341
				45	Bean	0.01	0.02	0.03	
				60	Bean	0.01	0.02	0.03	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Minas Gerais, Araguari, Mundo Novo, G130244	foliar	2 (30)	0.36	0	Bean	0.08	0.17	0.25	2014/3021341
				45	Bean	0.02	0.04	0.06	
				60	Bean	0.02	0.04	0.06	
				75	Bean	0.01	0.02	0.03	
				90	Bean	<0.01	0.01	0.02	
Brazil, 2014, Parana, Jaguapitã, Tupi, G130245	foliar	2 (29)	0.24	0	Bean	<0.01	<0.01	<0.02	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	0.01	0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Parana, Jaguapitã, Tupi, G130245	foliar	2 (29)	0.36	0	Bean	0.01	0.02	0.03	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Parana,	foliar	2 (29)	0.24	0	Bean	<0.01	<0.01	<0.02	2014/3021341
				45	Bean	<0.01	<0.01	<0.02	

Year, Location, Variety, Trial No.	Application					Residue mg/kg			
	Method	No (int.days)	Rate kg ai/ha	DALA	Portion analysed	E-ISOMER	Z-ISOMER	Total	Study Reference
Cambé, IPR 103, G130246				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2014, Parana, Cambé, IPR 103, G130246	foliar	2 (29)	0.36	0	Bean	<0.01	<0.01	<0.02	2014/3021341
				45	Bean	0.04	0.02	0.06	
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Minas Gerais, Indianopolis, Catuai, G150229	foliar	2 (29)	0.36	45	Bean	<0.01	<0.01	<0.02	2017/3001462
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Minas Gerais, Indianopolis, Catuai, G150229	foliar	2 (29)	0.48	45	Bean	<0.01	0.01	0.02	2017/3001462
				60	Bean	<0.01	<0.01	<0.02	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Sao Paulo, Campinas, Catuai amarelo, G150230	foliar	2 (28)	0.36	45	Bean	<0.01	<0.01	<0.02	2017/3001462
				60	Bean	0.02	0.03	0.05	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Sao Paulo, Campinas, Catuai amarelo, G150230	foliar	2 (28)	0.48	45	Bean	<0.01	0.01	0.02	2017/3001462
				60	Bean	0.01	0.02	0.03	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Sao Paulo, Leme, Obata, G150231	foliar	2 (28)	0.36	45	Bean	<0.01	<0.01	<0.02	2017/3001462
				60	Bean	0.01	0.02	0.03	
				75	Bean	<0.01	<0.01	<0.02	
				90	Bean	<0.01	<0.01	<0.02	
Brazil, 2016, Sao Paulo, Leme, Obata, G150231	foliar	2 (28)	0.48	45	Bean	0.01	0.04	0.05	2017/3001462
				60	Bean	<0.01	0.02	0.03	
				75	Bean	0.01	0.03	0.04	
				90	Bean	<0.01	<0.01	<0.02	

FATE OF RESIDUES DURING PROCESSING

Oranges

The Meeting received processing studies for oranges (Guimarães S.F., 2014 d 2014/3004081, and Guimarães S.F., 2018 b 2018/3000482). Three field trials were conducted in Brazil in 2013 to investigate the residue behaviour of metaflumizone in oranges (whole fruits) and its processed fractions, i.e., dried pulp, juice and oil. Metaflumizone was applied three times as a broadcast foliar spray at 2.4 kg ai/ha in 2000 L/ha of water (5× the maximum label rate) at BBCH 89 with a 10 day interval between each application. Samples (minimum 2.0 kg) were harvested at 7 DALA. For processing, around 250 kg citrus fruit per sample were washed, peeled, and fruit as well as oil from juice and dried pulp were separated. Samples of orange fruit, dried pulp, juice and oil were frozen and packed in separate plastic

bags to be stored in a frozen at ≤-20 °C. The maximum storage interval from harvest till analysis was 119 days. The residues of metaflumizone E-isomer and Z-isomer in oranges and processed commodity fractions were determined using LC-MS/MS method BASF 531/1 with LOQs of 0.01 mg/kg for each analyte. The processing procedures for peeled fruits and juice are described below.

Orange processing: For processing around 250 kg of orange fruit, per sample, were washed using an industrial water bath and rotary brush cleaner (Barana machine with 13 brushed axels, water bath and two rows of nozzles). Cleaned fruits were transferred to an industrial extractor (JBT HP 391 at standard configuration HP 2H2L (NFC), using 2 'cups') for separation of peel, fruit and oil from juice and dried pulp. During crushing the of the fruit, water was sprayed onto the fruit and 'cups'. The resulting waste water (yellow water) was recovered as a mixture of citrus oil and water. The peel-juice mixture was passed through a finisher (JBT UCF35, with 0.01"mesh", set at 27 to 28 psi) to separate juice from dried pulp. The 'yellow-water' was decanted and centrifuged to obtain oil. Juice and dried pulp samples were taken at the finisher.

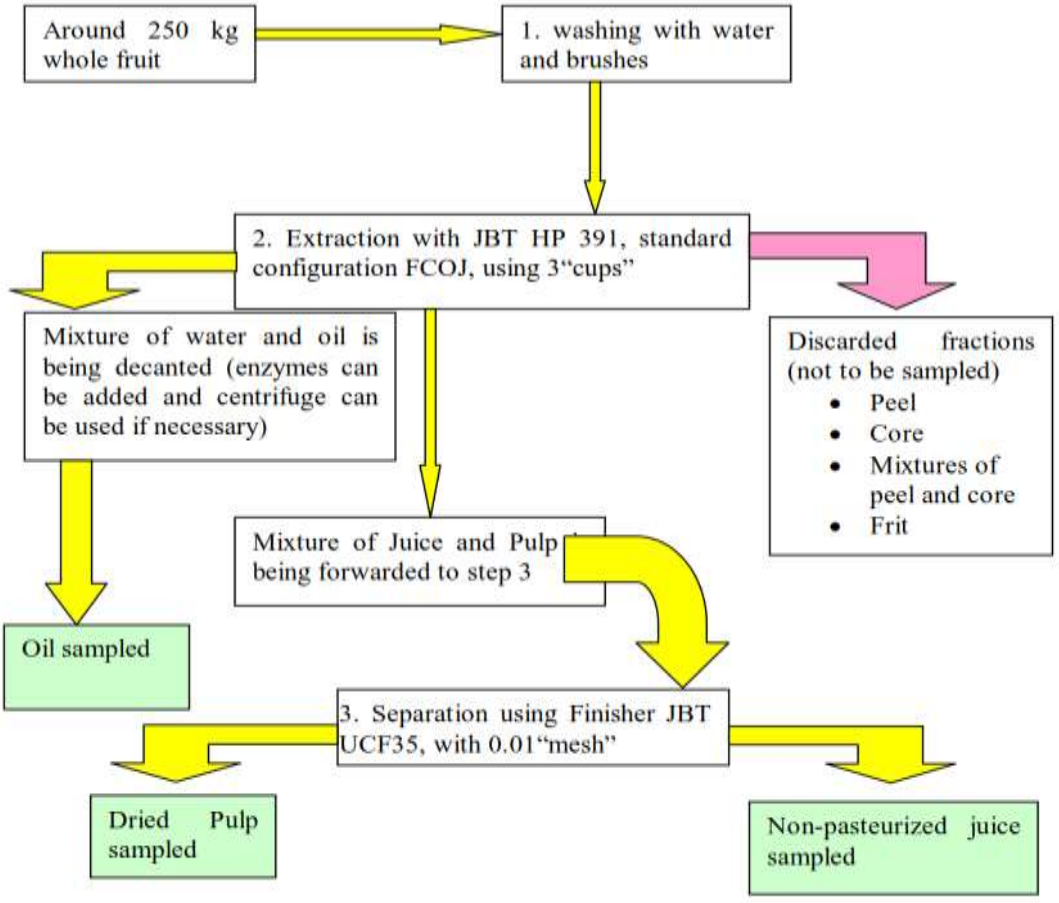

Figure 1 Orange processing flow chart

Table 19 Residues of total metaflumizone (E- and Z-isomer) in oranges after application of BAS 320 00 I

Matrix	Trail no.	Residues [mg/kg] [a]				Sum of residues of metaflumizone (E and Z) [b] [mg/kg]
		Metaflumizone (E)	Metaflumizone (Z)	M320I04 (parent eq)	M320I23 (parent eq)	
Orange, whole fruit	G130175	2.92	4.33	0.3151	0.0487 [c]	7.25
	G130176	1.60	2.71	0.2626	0.0389	4.13

	G130177	2.19	3.23	0.2626	0.0195	5.42
Orange, dried pulp	G130175	0.02	0.03	<0.0175	<0.0097	0.05
	G120080	0.02	0.03	<0.0175	<0.0097	0.05
	G130177	0.02	0.03	<0.0175	<0.0097	0.05
Orange, juice	G130175	0.03	0.02	<0.0175	<0.0097	0.05
	G130176	0.04	0.03	0.0350	<0.0097	0.07
	G130177	0.05	0.03	0.0350	<0.0097	0.08
Orange, oil	G130175	126.94	19.10	1.4355	0.7688	146.04
	G130176	140.10	11.38	1.7857	0.7590	151.48
	G130177	177.66	11.30	4.6568	0.4379	188.96

[a] All residues expressed in terms of parent BAS 320 I. The validated LOQ for each analyte is 0.01 mg/kg (expressed as parent equivalents, 0.0097 mg/kg for M320I23 and 0.0175 mg/kg for M320I04).

[b] Residues values of below LOQ were considered 0.01 mg/kg for calculating the total metaflumizone residues (sum of E and Z isomers).

[c] Mean of results

Table 20 Summary of total metaflumizone (E- and Z-isomer) and transfer factors in orange and its processed fractions after application of metaflumizone

Matrix	Residue total Metaflumizone mg/kg			Transfer factor [a] Metaflumizone			
Trial (application rate)	G120078	G120080	G120081	G120078	G120080	G120081	Median
Orange, whole fruit (3× 2.4 kg ai/ha)	7.25	4.31	5.42	-	-	-	-
Orange, dried pulp (3× 2.4 kg ai/ha)	0.05	0.05	0.05	0.01	0.01	0.01	0.01
Orange, juice (3× 2.4 kg ai/ha)	0.05	0.07	0.08	0.01	0.02	0.01	0.01
Orange, oil (3× 2.4 kg ai/ha)	146.04	151.48	188.96	20.14	35.15	34.86	34.86

[a] Transfer factor = total metaflumizone (E- and Z-isomer) in processed fraction / total metaflumizone (E- and Z-isomer) in whole fruit.

Apples

The Meeting received apple processing studies from the USA (Wyatt D.R., 2015 b, 2014/7002590). Three field trials were conducted on apples in the USA in 2013 to investigate the residue behaviour of metaflumizone in apples and the processed fractions apple sauce, canned apples, dried apples, dried pomace, fruit syrup, juice, wash water, washed apples and wet pomace. Metaflumizone 240 g/L SC was applied four times as a foliar spray at an exaggerated rate of 1.2 kg ai/ha in 935–1412 L/ha of water (5× the maximum label rate) between BBCH 76–89 and the intervals between each application were 6–8 days. The fruit were sampled at normal crop maturity on the day of the last application (0 DALA), i.e., 24 fruits, about 5 kg and for processing a minimum of 150 kg bulk samples. Prior to processing, a representative unwashed apple whole fruit RAC sample was collected and placed in frozen storage.

Apple processing: The apples were washed in a stainless steel wash cart using a ratio of 2 kg of cold water to each 1 kg of fruit for 5 minutes. The washed apples were then fed into the Suntech fruit press hammermill and reduced to crushed apple pulp. The crushed apple pulp was transferred to the 35 L Swept Surface steam Jacketed kettle and heated with low-pressure steam until the temperature of the apple pulp reached 45–50 °C, 1.5 g of pectin enzyme per kg of apple pulp was then added and mixed for approximately 2 minutes. The enzyme treated pulp was permitted to react for approximately 2 hours, then pressed using the Suntech fruit press. The wet pomace was removed, and dried at 70–83 °C, the dried pulp was milled, the fresh juice was filtered to remove any coarse solids. The fresh juice for apple syrup was combined with sugar, lemon juice and pectin and boiled at 100 ºC for 2 minutes.

All samples were stored frozen at ≤-20°C until analysis. The maximum storage interval from harvest until analysis was 357 days. The residues of metaflumizone E- and Z-isomer in apple and

processed commodity samples were determined using LC-MS/MS method with an LOQ of 0.02 mg/kg for the two isomers.

Table 20 Residues of total metaflumizone (E- and Z-isomer) in apple and its processed fractions

Matrix	Trial no.	Residues [mg/kg][a]			Sum of residues (E and Z)[b] [mg/kg]
		metaflumizone (E)	metaflumizone (Z)	M320I04 (parent eq.)	
Apple, whole fruit	R130332	0.690	0.720	0.140	1.410
	R130333	0.820	0.480	0.310	1.300
	R130334	0.450	0.340	0.070	0.790
Apple sauce	R130332	<0.02	<0.02	<0.035	<0.04
	R130333	<0.02	<0.02	<0.035	<0.04
	R130334	<0.02	<0.02	<0.035	<0.04
Canned apples	R130332	<0.02	<0.02	<0.035	<0.04
	R130333	<0.02	<0.02	<0.035	<0.04
	R130334	<0.02	<0.02	<0.035	<0.04
Dried apples	R130332	0.034	<0.02	<0.035	0.054
	R130333	0.033	<0.02	<0.035	0.053
	R130334	0.025	<0.02	<0.035	0.045
Dried pomace	R130332	15.000	8.100	3.100	23.100
	R130333	12.000	4.900	2.700	16.900
	R130334	9.000	4.600	1.200	13.600
Fruit syrup	R130332	0.027	<0.02	<0.035	0.047
	R130333	0.051	<0.02	0.050	0.071
	R130334	0.020	<0.02	<0.035	0.040
Juice	R130332	0.065	0.025	<0.035	0.090
	R130333	0.340	0.200	0.040	0.540
	R130334	0.042	0.020	<0.035	0.062
Wet pomace	R130332	3.100	3.300	0.770	6.400
	R130333	2.600	1.900	0.650	4.500
	R130334	1.500	1.100	0.240	2.600
Washed apples	R130332	0.120	0.240	0.073	0.360
	R130333	0.250	0.320	0.190	0.570
	R130334	0.090	0.120	<0.035	0.210
Wash water	R130332	0.038	0.030	<0.035	0.068
	R130333	0.150	0.079	<0.035	0.229
	R130334	<0.02	<0.02	<0.035	<0.04

[a] All residues expressed in terms of parent BAS 320 I. The validated LOQ for each analyte is 0.02 mg/kg (expressed as parent equivalents, 0.035 mg/kg for M320I04).

[b] Residues values of below LOQ were considered 0.02 mg/kg for calculating the total metaflumizone residues (sum of E and Z isomers).

Table 721 Summary of total metaflumizone (E- and Z-isomer) and transfer factors in apple and its processed fractions after application of METAFLUMIZONE

Matrix	Residue total Metaflumizone mg/kg			Transfer factor [a] Metaflumizone			
Trial	R130332	R130333	R130334	R130332	R130333	R130334	Median
Apple, whole fruit	1.410	1.300	0.790	-	-	-	-
Apple sauce	<0.04	<0.04	<0.04	0.03	0.03	0.05	0.03
Canned apples	<0.04	<0.04	<0.04	0.03	0.03	0.05	0.03
Dried apples	0.054	0.053	0.045	0.04	0.04	0.06	0.04
Dried pomace	23.100	16.900	13.600	16.38	13.00	17.22	16.38
Fruit syrup	0.047	0.071	0.040	0.03	0.05	0.05	0.05
Juice	0.090	0.540	0.062	0.06	0.42	0.08	0.08
Wet pomace	6.400	4.500	2.600	4.54	3.46	3.29	3.46
Washed apples	0.360	0.570	0.210	0.26	0.44	0.27	0.27
Wash water	0.068	0.229	<0.04	0.05	0.18	0.05	0.05

[a] Transfer factor = total metaflumizone (E- and Z-isomer) in processed fraction / total metaflumizone (E- and Z-isomer) in whole fruit.

Grapes

The Meeting received grapes processing studies from the USA (Wyatt D.R., 2015a, 2014/7002591). Three field trials were conducted on grapes in the USA in 2013 to investigate the residue behaviour of metaflumizone in grapes and its processed fractions whole fruit, raisins, stalks (raisins), crush, must deposit, must naturally cloudy, must separated, pasteurized juice, pomace, red and rose wine, stalks and yeast deposit. Metaflumizone 240 g/L SC was applied three times as a foliar spray at an exaggerated rate of 1.2 kg ai/ha in 1048–1786 L/ha of water (5× the maximum label rate) between BBCH 83–89 and the intervals between each application were 7 days. Samples of RAC (12 bunches, minimum 2 kg) and samples for processing (minimum 100 kg) were harvested at normal crop maturity (BBCH 89) on the day of the last application (0 DALA). The bulk samples for raisin generation were dried at each field site to produce at least 12.1 kg of dried fruit (including stems). Grapes were processed into crush (red wine production), must deposit, must naturally cloudy and must separated (red and rose wine making), pasteurized juice (red and rose), pomace (red and rose), red wine, rose wine, stalks (red wine making) and yeast deposit (red and rose). All samples were stored frozen at ≤-20 °C until analysis. The maximum storage interval from harvest until analysis was 362 days. The residues of metaflumizone E- and Z-isomer in grapes and processed commodity samples were determined using an LC-MS/MS method with a LOQ of 0.02 mg/kg for each parent isomer.

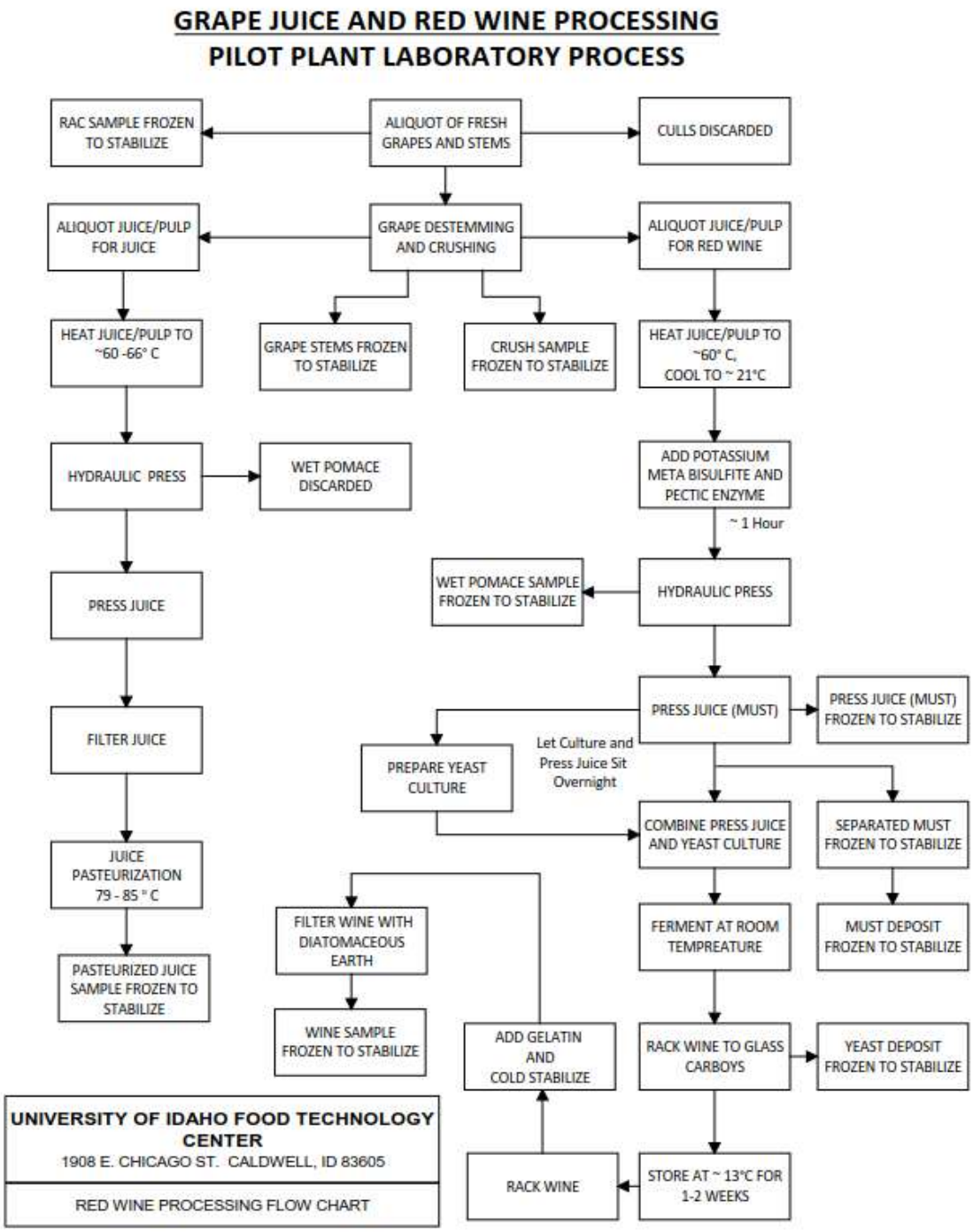

Figure 2 Flow chart for grape juice and red wine processing

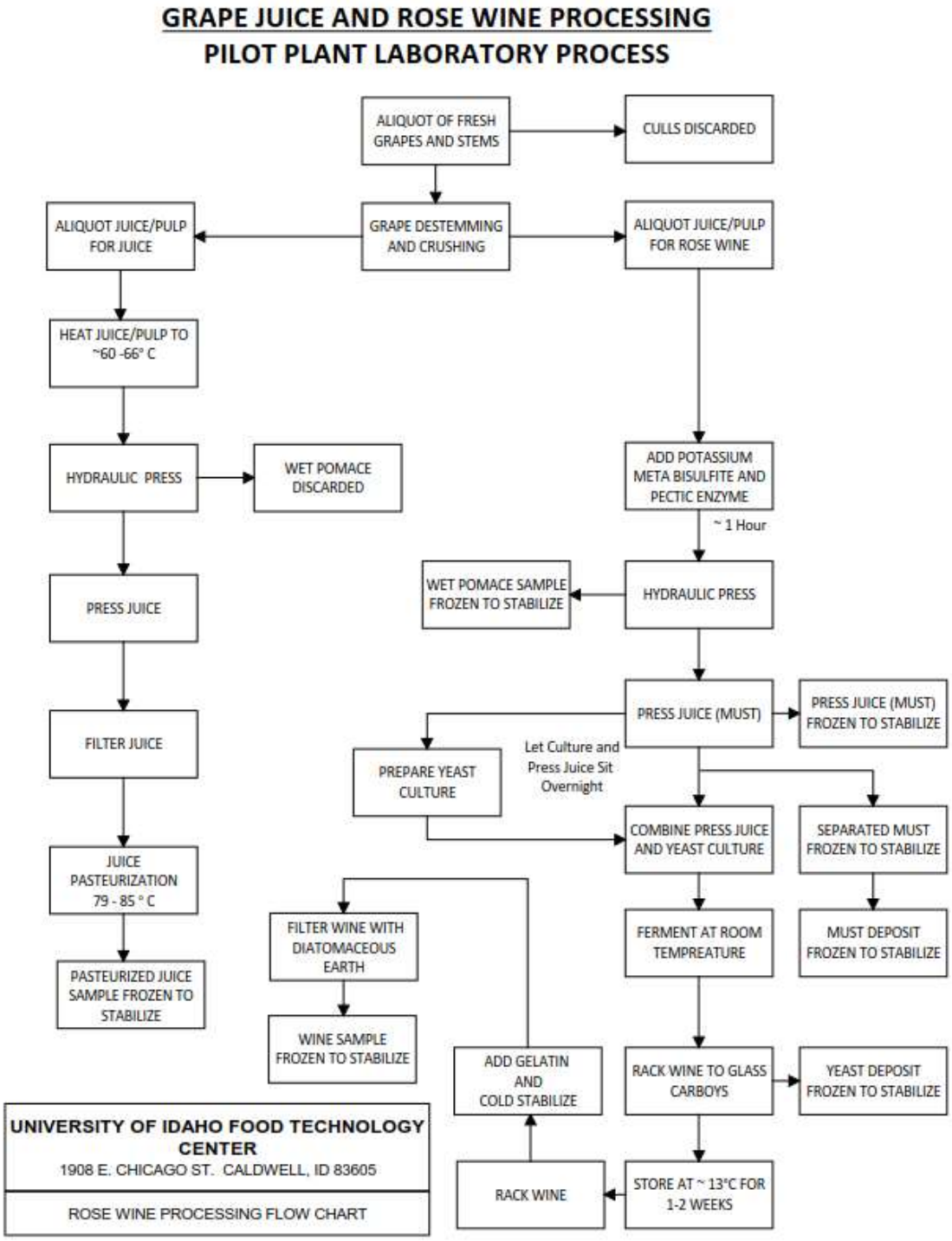

Figure 3 Flow chart of grape juice and Rose wine processing

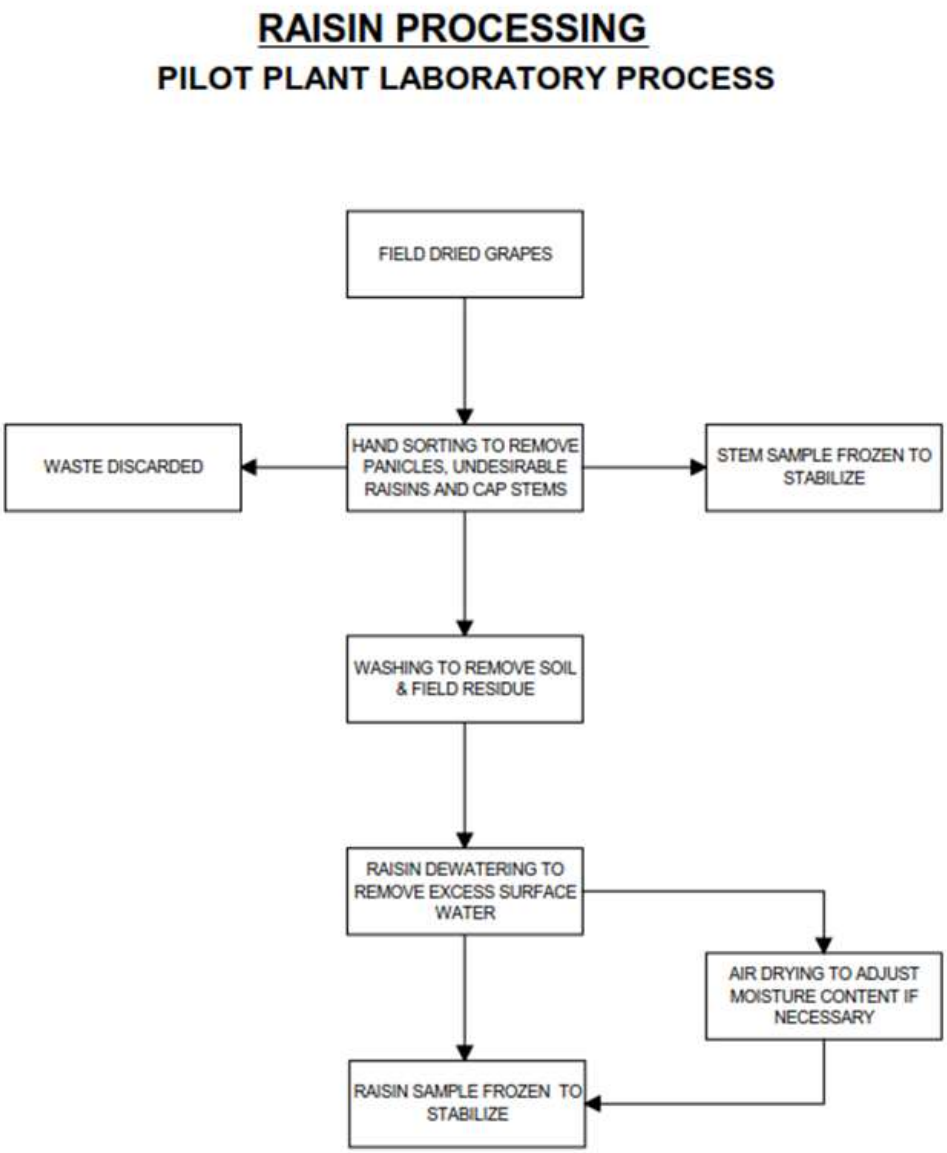

Figure 4 Flow chart of raisin processing

Table 22 Residues of total metaflumizone (E and Z-isomer) in grape and its processed fractions

Matrix	Trial no	Residues [mg/kg]1			Sum of residues of (E and Z)2 [mg/kg]
		metaflumizone (E)	metaflumizone(Z)	M320I04 (parent eq.)	
Grape, whole fruit	R130335	2.8	1.9	0.19	4.7
	R130336	0.26	0.12	<0.035	0.38
	R130337	0.3	0.2	0.053	0.5
Crush (red wine)	R130335	3.8	2	0.14	5.8
	R130336	0.3503	0.1703	0.0463	0.521
	R130337	0.55	0.25	0.054	0.8
Must deposit (red wine)	R130335	0.33	0.1	0.075	0.43
	R130336	0.41	0.11	<0.035	0.52

Matrix	Trial no	Residues [mg/kg]1			Sum of residues of (E and Z)2 [mg/kg]
		metaflumizone (E)	metaflumizone(Z)	M320I04 (parent eq.)	
	R130337	0.98	0.27	0.071	1.25
Must deposit (rose wine)	R130335	0.089	0.022	<0.035	0.111
	R130336	0.31	0.092	<0.035	0.402
	R130337	0.19	0.062	<0.035	0.252
Must naturally cloudy (red wine)	R130335	0.39	0.15	<0.035	0.54
	R130336	0.55	0.18	<0.035	0.73
	R130337	0.67	0.22	0.061	0.89
Must naturally cloudy (rose wine)	R130335	0.055	<0.02	<0.035	0.075
	R130336	0.31	0.094	<0.035	0.404
	R130337	0.67	0.24	<0.035	0.91
Must separated (red wine)	R130335	0.068	<0.02	<0.035	0.088
	R130336	0.077	0.023	<0.035	0.1
	R130337	0.66	0.23	<0.035	0.89
Must separated (rose wine)	R130335	0.041	<0.02	<0.035	0.061
	R130336	0.043	<0.02	<0.035	0.063
	R130337	0.062	<0.02	<0.035	0.082
Pasteurized juice (red wine)	R130335	0.57	0.08	0.15	0.65
	R130336	0.46	0.087	0.038	0.547
	R130337	0.39	0.048	0.054	0.438
Pasteurized juice (rose wine)	R130335	0.83	0.14	0.24	0.97
	R130336	0.94	0.12	0.073	1.04
	R130337	0.56	0.063	0.052	0.623
Pomace (red wine)	R130335	9	4.7	1.2	13.7
	R130336	0.68	0.29	0.22	0.97
	R130337	0.7	0.37	0.27	1.07
Pomace (rose wine)	R130335	9.8	5.7	0.54	15.5
	R130336	0.67	0.26	0.1	0.93
	R130337	0.36	0.23	0.067	0.59
Raisins	R130335	11	1.2	2.1	12.2
	R130336	0.46	0.62	0.12	1.08
	R130337	0.26	0.37	0.08	0.63
Red wine	R130335	<0.02	<0.02	<0.035	<0.04
	R130336	<0.02	<0.02	<0.035	<0.04
	R130337	<0.02	<0.02	<0.035	<0.04
Rose wine	R130335	<0.02	<0.02	<0.035	<0.04
	R130336	<0.02	<0.02	<0.035	<0.04
	R130337	<0.02	<0.02	<0.035	<0.04
Stalks (raisins)	R130335	72	18	1.6	90
	R130336	2	2.3	0.27	4.3
	R130337	1.9	2.2	0.38	4.1
Stalks (red wine)	R130335	6.6	2.8	0.18	9.4
	R130336	0.57	0.22	0.055	0.79
	R130337	0.76	0.34	0.11	1.1
Yeast deposit (red wine)	R130335	17	1.8	0.58	18.8
	R130336	9.4	1.1	0.26	10.5

Matrix	Trial no	Residues [mg/kg]1			Sum of residues of (E and Z)2 [mg/kg]
		metaflumizone (E)	metaflumizone(Z)	M320I04 (parent eq.)	
	R130337	22	2.9	0.43	24.9
Yeast deposit (rose wine)	R130335	5.1	0.46	0.15	5.56
	R130336	17	1.5	0.36	18.5
	R130337	15	1.1	0.26	16.1

[a] Transfer factor = total metaflumizone (E- and Z-isomer) in processed fraction / total metaflumizone (E- and Z-isomer) in whole fruit.

Sugar cane

The Meeting received a sugarcane processing study (Guimarães S.F., 2014c 2014/3000343). During the growing seasons of 2012 and 2013, two field trials were conducted on sugar cane in Brazil to investigate the residue behaviour of metaflumizone (BAS 320 I) in sugar cane and its processed fractions after treatment with metaflumizone (240 g/L SC). The test item was applied once in-furrow at exaggerated rates between 5.4–6.0 kg ai/ha in 150 L/ha of water at BBCH 00. Duplicate treated raw agricultural commodity (RAC) samples (minimum 2 kg) and bulk samples for processing (minimum 150 kg) were harvested at BBCH 49. Leaves and straws were separated from the sugarcane stalks. No residues were detected in the RAC samples (stalks) above the limit of quantitation of 0.01 mg/kg in the treated samples; therefore, it was not necessary to process and analyse the processing fractions.

Coffee beans

The Meeting received a coffee bean processing study (Guimarães S.F., 2017a 2017/3001463). Four field trials were conducted on coffee in Brazil in 2016 to investigate the residue behaviour of metaflumizone in coffee beans, dried coffee cherry and the processed fractions roasted and ground beans, concentrated liquor and instant coffee. Metaflumizone 240 g/L SC was applied twice as a foliar spray at an exaggerated rate of 1.8 kg ai/ha in 400 L/ha of water (3.75× the maximum label rate) between BBCH 77–85 with a 30 day spray application interval. Samples of cherry coffee (180 kg from 58 plants) were harvested at 45 DALA (BBCH 85–89). Samples were first kept frozen (at ≤-20 °C) until processing. The maximum storage interval from harvest till analysis was 146 days. The residues of metaflumizone E- and Z-isomer in coffee beans and processed commodity samples were determined using a LC-MS/MS method with LOQs of 0.01 mg/kg for each analyte.

Roasting: A 2 kg sample of frozen coffee beans were separated and kept at room temperature to defrost. A 1.0 kg sample of the defrosted coffee beans was roasted in fractions of 200–300 g in roasters to generate samples of roasted and grounded beans. After roasting, the coffee beans were stored at room temperature for a maximum of 18 hours to expel CO_2 generated during the process and to equalize moisture levels. The equipment was kept in operation at 250 °C for 10 minutes, cleaned with hot water and ethanol, between samples to eliminate any potential pesticide residue contaminants.

Grinding: After equalizing, the roasted coffee beans were ground in a cone mill. After the grinding of each fraction, an aliquot of 100 g was taken and its particle size classification was determined by the equipment Produtest with rheostat on 8 for 30 minutes. Roasted and grounded coffee produced was stored in high density polyethylene containers (packed in double plastic bags) at -20 °C.

Concentrated Liquor: Roasted coffee beans were ground in a cone mill and then sieved to remove fines. The coffee was weighed, separated in fractions of 2.5 kg and stored in plastic bags at 5 °C until processing in the extraction columns. The water used for extraction was heated by a water bath kept at (90 ± 5) ºC with an immersed resistance coil. The residence time of the water in each column was 17±1 minutes. The extract was collected with DOR (Draw of Ratio) of 0.8–1.0 from the column. The extract was stored in high density polyethylene containers of 250–330 mL and kept in freezer at -20 °C.

Instant Coffee: The stored extract was dried by a Spray Dryer (B191, Buchi) for production of instant coffee using a air flow sprayer.

Table 24 Residues of total metaflumizone (E- and Z-isomer) in coffee and its processed fractions after application of BAS 320 00 I

Matrix	Trial no.	Residues [mg/kg][a]				Sum of residues of E and Z [b] [mg/kg]
		metaflumizone (E)	metaflumizone(Z)	M320I04	M320I23	
Coffee beans	G150166	<0.01	<0.01	<0.0175	<0.0097	<0.02
	G150167	<0.01	<0.01	<0.0175	<0.0097	<0.02
	G150168	<0.01	<0.01	<0.0175	<0.0097	<0.02
	G150169	0.031	0.057	<0.0175	<0.0097	0.088
Dried coffee cherry	G150166	0.500	0.810	0.0595	0.0185	1.310
	G150167	0.320	0.580	0.0368	0.0127	0.900
	G150168	0.330	0.530	0.0350	0.0117	0.860
	G150169	1.500	2.500	0.1287	0.0311	4.000
Roasted and ground beans	G150169	<0.01	<0.01	<0.0175	<0.0097	<0.02
Concentrated liquor	G150169	<0.01	<0.01	<0.0175	<0.0097	<0.02
Instant coffee	G150169	<0.01	<0.01	n.a.[c]	<0.0097	<0.02

[a] All residues expressed in terms of parent BAS 320 I. The validated LOQ for each analyte is 0.01 mg/kg (expressed as parent equivalents, 0.0097 mg/kg for M320I23 and 0.0175 mg/kg for M320I04).

[b] Residues values of below LOQ were considered 0.01 mg/kg for calculating the total metaflumizone residues (sum of E and Z isomers).

[c] This matrix was not analysed for M320I04 due to a high interference of matrix in the recovery. Even when using matrix-matched standards, the results were not satisfactory.

Table 25 Summary of total metaflumizone (E- and Z-isomer) and transfer factors in coffee and its processed fractions after application of metaflumizone

Matrix	Residue total Metaflumizone mg/kg				Transfer factor1 Metaflumizone				
Trial	G150166	G150167	G150168	G150169	G150166	G150167	G150168	G150169	Mean
Coffee beans	<0.02	<0.02	<0.02	0.088	-	-	-	-	-
Dried coffee cherry	1.310	0.900	0.860	4.000	n.a.	n.a.	n.a.	45.45	n.a.
Roasted and ground beans	-	-	-	<0.02	-	-	-	0.23	n.a.
Concentrated liquor	-	-	-	<0.02	-	-	-	0.23	n.a.
Instant coffee	-	-	-	<0.02	-	-	-	0.23	n.a.

[a] Transfer factor = total metaflumizone (E- and Z-isomer) in processed fraction / total metaflumizone (E- and Z-isomer) in whole fruit.

n.a. = not applicable

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Metabolism in plants

Metaflumizone is a broad-spectrum semicarbazone insecticide composed of two optical isomers in the ratio E: Z of 90: 10. Metaflumizone was first evaluated for residues and toxicology in JMPR 2009, and ADI of 0–0.1mg/kg bw was established and the ARfD was unnecessary. The residue definition for compliance with MRLs and estimation of dietary intake for plants and animals: metaflumizone, sum of E-isomer and Z-isomer. The residue is fat-soluble.

Metaflumizone was scheduled at the 50th session of the CCPR for additional uses for residues by the 2019 JMPR extra meeting. The Meeting received information on environmental fate in soil, storage stability, use patterns, supervised residue trials, fate of residue during processing.

Environmental fate

The Meeting received one study of metaflumizone on degradation under aerobic condition in Brazilian soil. The half-lives of Metaflumizone applied at rate of 240 g ai/ha in four different soils were 61–205 days, the M320I04 was the major degradation product up to 21% of total applied radioactivity (61 days after application). The study confirmed the conclusion of previous evaluation.

Stability of residues in stored analytical samples

The Meeting received one storage stability study. The incurred residues of metaflumizone are stable at <-5°C for at least 729 to 971 days (24–32 months) in cucumber, sunflower seed, snap bean (succulent seed), potato, and strawberry.

Results of supervised residue trials on crops

Supervised residue trial data were available for metaflumizone on citrus fruits, apples, grapes, melons, soya bean, maize, sugarcane and coffee bean.

Citrus fruits

The critical GAP for citrus fruits in Brazil is for 3 foliar applications at rate of 0.48 kg ai/ha, with a retreatment interval of 7 days and a PHI of 7 days. The Meeting received supervised residue trial data for metaflumizone on oranges and lemon conducted in Brazil.

In 11 trials conducted approximating the Brazilian GAP, the residues of metaflumizone in orange fruits were: 0.22(2), 0.34, 0.42(2), 0.66, 0.71, 0.84, 1.01, 1.21 and 1.35 mg/kg (n=11).

The Meeting estimated a maximum residue level of 3 mg/kg, and an STMR of 0.66 mg/kg for oranges, and agreed to extrapolate to the Oranges, Sweet, Sour sub group (including Orange-like hybrids, FC 0004).

In five trials conducted approximating the Brazilian GAP, residues of metaflumizone in lemon fruits were: 0.27, 0.3, 0.52, 0.91and 1.06 mg/kg (n=5).

The Meeting estimated a maximum residue level of 2 mg/kg, and an STMR of 0.52 mg/kg for lemons, and agreed to extrapolate to the Lemons and limes subgroup (including citron, FC 0002).

Apples

The critical GAP for apples in Brazil is 4 foliar applications at a rate of 0.24 kg ai/ha, with retreatment interval of 7 days and a PHI of 3 days. The Meeting received supervised residue trial data for metaflumizone on apples conducted in Brazil.

In 12 trials conducted approximating the critical GAP in Brazil, the residues of metaflumizone in apples were: 0.16, 0.17, 0.19, 0.22, 0.24, 0.25, 0.3, 0.33, 0.43, 0.48, 0.52 and 0.54 mg/kg (n=12).

The Meeting estimated a maximum residue level of 0.9 mg/kg and an STMR of 0.275 mg/kg for apples.

Grapes

The critical GAP for grapes in Brazil is 3 foliar applications at rate of 0.24 kg ai/ha, with a retreatment interval of 7 days and a PHI of 3 days. The Meeting received supervised residue trial data for metaflumizone on grapes conducted in Brazil.

In trials conducted approximating Brazilian GAP, the residues of metaflumizone in grapes were: 0.15, 0.27, 0.51, 0.63, 0.64, 0.75, 1.21, 1.39, 1.4, 1.84, 1.72 and 2.71 mg/kg (n=12).

The Meeting estimated a maximum residue level of 5 mg/kg and an STMR of 0.98 mg/kg for grapes.

Melons, except Watermelons

The critical GAP for melons in Brazil is 5 foliar applications at rate of 0.192 kg ai/ha, with a retreatment interval of 7 days and a PHI of 3 days. The Meeting received supervised residue trial data for metaflumizone on melons conducted in Brazil.

In trials conducted approximating GAP, the residues of metaflumizone in melons were: < 0.02(2), 0.07, 0.1, 0.14, 0.2, 0.29 and 0.61 mg/kg (n=8), the residues of metaflumizone in pulp were < 0.02 (n=3).

The Meeting estimated a maximum residue level of 1 mg/kg and an STMR of 0.02 mg/kg for melons, except watermelon.

Soya bean

The critical GAP for soya bean in Brazil is 3 foliar applications at rate of 0.24 kg ai/ha, with a retreatment interval of 7 days and a PHI of 14 days. The Meeting received supervised residue trial data for metaflumizone on soya beans conducted in Brazil.

In trials conducted approximating Brazilian GAP, the residues of metaflumizone in soya beans were: < 0.02(3), 0.02(2), 0.03, 0.07 and 0.11 mg/kg (n=8).

The Meeting estimated a maximum residue level of 0.2 mg/kg and an STMR of 0.02 mg/kg for soya beans.

Maize

The critical GAP for maize in the Brazil is 5 foliar applications at rate of 0.24 kg ai/ha, with a retreatment interval of 7 days and a PHI of 14 days. The Meeting received supervised residue trial data for metaflumizone on maize conducted in Brazil.

In trials conducted approximating Brazilian GAP, the residues of metaflumizone in maize grains were: < 0.02(7), 0.02 mg/kg (n=8).

The Meeting estimated a maximum residue level of 0.04 mg/kg and an STMR of 0.02 mg/kg for maize grains.

Sugarcane

The critical GAP for sugarcane in Brazil is one application at rate of 0.48 kg ai/ha as an in-furrow treatment at planting. The Meeting received supervised residue trial data for metaflumizone on sugarcane conducted in Brazil.

In trials conducted at an exaggerated rate of 1.2 kg ai/ha, the residues of metaflumizone in sugarcane were: < 0.02(6) mg/kg.

The Meeting estimated a maximum residue level of 0.02(*) mg/kg and an STMR of 0 mg/kg for sugarcane considering all residues were less than LOQ after application at 3 times the GAP rate as an in-furrow at planting treatment.

Coffee bean

The critical GAP for coffee in Brazil is 2 foliar applications at rate of 0.48 kg ai/ha, with a retreatment interval of 30 days and a PHI of 45 days. The Meeting received supervised residue trial data for metaflumizone on coffee conducted in Brazil.

In trials conducted approximating Brazilian GAP, the residues of metaflumizone in coffee beans were: < 0.02(6), 0.02(2), 0.05(2), 0.06(2), 0.09 mg/kg (n=13).

The Meeting estimated a maximum residue level of 0.15 mg/kg and an STMR of 0.02 mg/kg for coffee beans

Fate of residues during processing

The Meeting received processing studies on orange, apple, grape and coffee. A summary of the processing factors is provided below.

Commodity	Processed Fraction	Processing Factor	Best estimate PF	RAC STMR or STMR-P or median residues
Orange	Fruits (RAC)			0.66
	Juice	0.01, 0.01, 0.02	0.01	0.0066
	Dry pulp	0.01, 0.01, 0.01	0.01	0.0066
	Oil	20.14, 34.86, 35.15	34.86	23
Coffee				0.02
	Roasted and ground beans	0.23	0.23	0.046
	Instant coffee	0.23	0.23	0.046
Apple				0.275
	Juice	0.06, 0.08, 0.42	0.08	0.022
	Apple sauce	<0.03, <0.03, <0.05	<0.03	<0.00825
	Canned apples	<0.03, <0.03, <0.05,	<0.03	<0.00825
	Dried apples	0.04, 0.04, 0.06	0.04	0.011
	Dried pomace	13.00, 16.38, 17.22	16.38	4.5
	Wet pomace	3.29, 3.46, 4.54	3.46	0.95
Grape				0.98
	Must separated	0.01, 0.02, 0.16, 0.17, 0.26, 1.78	0.165	0.16
	Must naturally cloudy	0.02, 0.11, 1.06, 1.78, 1.82, 1.92	1.42	1.39
	Pasteurized juice	0.14, 0.21, 0.88, 1.25, 1.44, 2.74	1.065	1.04
	Pomace	1.18, 2.14, 2.45, 2.55, 2.91, 3.30	2.5	2.45
	Raisins	1.26, 2.60, 2.84	2.60	2.55
	Wine	<0.01, <0.1, <0.08, <0.08, <0.11, <0.11	<0.08	0.078

The residues of Metaflumizone concentrated in orange oil, and raisins, the Meeting estimated a maximum residue level of 100 mg/kg (3 × 35) for orange oil, 13 mg/kg (5 × 2.6) for grape raisin.

Residues in animal commodities

Estimation of livestock dietary burdens

Dietary burdens were calculated for beef cattle, dairy cattle, broilers and laying poultry based on feed items evaluated by the JMPR. Potential cattle feed items include: citrus pulp, apple pomace, grape pomace, tomato pomace, maize grain and soya bean seed. The dietary burdens, estimated using the OECD diets listed in Appendix IX of the 2016 edition of the FAO manual, are presented in Annex 6 and summarized below.

Summary of livestock dietary burden (ppm Metaflumizone equivalents of dry matter diet)

	US-Canada		EU		Australia		Japan	
	Max	Mean	Max	mean	max	Mean	max	Mean
Beef cattle	0.02	0.02	0.503	0.503	3.28	3.28	0.02	0.02
Dairy cattle	0.255	0.255	0.252	0.252	3.28 [A B]	3.28 [C D]	0.02	0.02
Broilers	0.022	0.02	0.02	0.02	0.003	0.003	0.016	0.016
Layers	0.022[E]	0.022[F]	0.019	0.019	0.0034	0.0034	0.0182	0.0182

[A] Highest maximum beef or dairy cattle dietary burden suitable for maximum residue level estimates for mammalian meat.

[B] Highest maximum dairy cattle dietary burden suitable for maximum residue level estimates for mammalian milk.

[C] Highest mean beef or dairy cattle dietary burden suitable for STMR estimates for mammalian meat.

[D] Highest mean dairy cattle dietary burden suitable for STMR estimates for milk.

[E] Highest maximum poultry dietary burden suitable for maximum residue level estimates for poultry meat and eggs.

[F] Highest mean poultry dietary burden suitable for STMR estimates for poultry meat and eggs.

Animal commodity maximum residue levels

The calculations used to estimate maximum residue levels, STMR values for cattle matrices are shown below.

	Feed level (ppm) for milk residues	Residues (mg/kg) in milk	Residues (mg/kg) in cream	Feed level (ppm) for tissue residues	Residues of metaflumizone (mg/kg)			
					Muscle	liver	Kidney	Fat
MRL (mg/kg), beef or dairy cattle								
Feeding study	1.0	<0.01	0.0519	1.0	<0.02	<0.02	<0.02	0.0429
	5.5	0.0286	0.242	5.5	<0.02	<0.02	<0.02	0.182
Dietary burden and high residue estimation	3.28	0.019	0.148	3.28	<0.02	<0.02	<0.02	0.115
STMR (mg/kg), beef or dairy cattle								
Feeding study	1.0	<0.01	0.0473	1.0	<0.02	<0.02	<0.02	0.0191
Dietary burden and median residue estimated	5.5	<0.01	0.117	5.5	<0.02	<0.02	<0.02	0.163
Dietary burden and median residue estimation	3.28	<0.01	0.083	3.28	<0.02	<0.02	<0.02	0.092

The maximum dietary burden calculated for cattle is 3.35 ppm for beef cattle and 3.34 ppm for dairy cattle. The mean dietary burden calculated for cattle is 3.35 ppm for beef cattle and 3.34 ppm for dairy cattle.

The Meeting estimated a maximum residue level of 0.02 mg/kg for milk, 0.6 mg/kg for milk fat (0.131x4, cream containing 25% fat) and 0.02*(fat) mg/kg for meat from mammals other than marine mammals, 0.02* mg/kg for edible offal (mammalian), and 0.15 mg/kg for mammalian fat except milk fat. The Meeting estimated STMRs of 0.01 mg/kg for milk, 0.33 mg/kg for milk fat, 0.02 mg/kg for meat from mammals other than marine mammals and edible offal (mammalian), and 0.092 mg/kg for mammalian fat. The Meeting decided to withdraw the previous recommendation.

The calculations used to estimate maximum residue levels, STMR values for poultry matrices are shown below.

	Feed level (ppm) for egg residues	Residues (mg/kg) in egg	Feed level (ppm) for tissue residues	Residues of metaflumizone (mg/kg)		
				Muscle	liver	Fat
MRL (mg/kg), broiler or layer poultry						
Feeding study	0.1	0.061	0.1	0.021	0.033	0.338
Dietary burden and high residue estimation	0.022	0.013	0.022	0.0046	0.0073	0.074
STMR (mg/kg), broiler or layer poultry						
Feeding study	0.1	0.035	0.1	0.01	0.031	0.315
Dietary burden and median residue estimation	0.022	0.0077	0.022	0.0022	0.00688	0.0693

The maximum and mean dietary burdens calculated for poultry (layers and broiler) are 0.022 ppm.

The Meeting estimated maximum residue levels of 0.02 mg/kg for egg, 0.02(*)(fat) mg/kg for poultry meat, 0.08 mg/kg for poultry fat and 0.02*mg/kg for poultry edible offal. The Meeting estimated

STMRs of 0.0077 mg/kg for eggs, 0.0022 mg/kg for poultry meat, 0.0068mg/kg for poultry edible offal, and 0.069 mg/kg for poultry fat.

RECOMMENDATIONS

On the basis of the data from supervised trials the Meeting concluded that the residue levels listed in Annex 1 are suitable for establishing maximum residue limits and for IEDI assessment.

The residue definition for compliance with MRLs and estimation of dietary intake for plants and animals: *metaflumizone, sum of E-isomer and Z-isomer*.

The residue is fat-soluble.

Commodity		Recommended maximum residue levels (mg/kg)		STMR or STMR-P, median residue (mg/kg)	
CCN	Name	New	Previous	New	Previous
FP 0226	Apple	0.9		0.275	
SB 0716	Coffee bean	0.15		0.02	
MO 0105	Edible offal (mammalian)	0.02*	0.02*(w)	0.02	0.013(w)
DF 0269	Dried grapes (=currants, Raisins and Sultanas)	13		2.55	
PE 0112	Eggs	0.02		0.0077	
FB 0269	Grape	5		0.98	
FC 0002	Lemons and limes, Sub group of	2		0.52	
GC 0645	Maize	0.04		0.02	
MF 0100	Mammalian fats (except milk fats)	0.6	0.02*(w)	0.092	0.013(w)
MM 0095	Meat (from mammals other than marine mammals)	0.02*(fat)	0.02*(w)	0.02	0.013(w)
VC 0046	Melon	1		0.02	
	Milk fat	0.7	0.02(w)	0.33	0.013(w)
ML 0106	Milks	0.02	0.01(w)	0.01	0.007(w)
	Orange oil	100		23	
FC 0004	Orange, sweet, sour, Sub group of	3		0.66	
PO 0111	Poultry edible offal	0.02*		0.0068	
PF 0111	Poultry fat	0.08		0.069	
PM 0110	Poultry meat	0.02*(fat)		0.0022	
VD 0541	Soya bean	0.2		0.02	
GS 0659	Sugar cane	0.02*		0	
For dietary estimation					
	Orange juice			0.0066	
	Orange dry pulp			0.0066	
	Roasted and ground beans			0.046	
	Instant coffee			0.046	
	Apple juice			0.022	
	Apple sauce			0.00825	
	Canned apples			0.00825	
	Dried apples			0.011	
	Apple, wet pomace			0.95	

Commodity		Recommended maximum residue levels (mg/kg)		STMR or STMR-P, median residue (mg/kg)	
CCN	Name	New	Previous	New	Previous
	Grape, must, naturally cloudy			1.39	
	Grape, must, separated			0.16	
	Grape, pasteurized juice			1.04	
	Grape, pomace			2.45	
	Grape, wine			0.078	

DIETARY RISK ASSESSMENT

Long-term dietary exposure

The ADI for metaflumizone is 0–0.1 mg/kg bw. The International Estimated Daily Intakes (IEDIs) for metaflumizone 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 Extra JMPR Report. The IEDIs ranged 1–4% of the maximum ADI. The Meeting concluded that long-term dietary exposure to residues of metaflumizone from uses considered by the JMPR is unlikely to present a public health concern.

Acute dietary exposure

The 2009 JMPR decided that an ARfD for metaflumizone was unnecessary. The Meeting therefore concluded that the acute dietary exposure to residues of metaflumizone from the considered uses is unlikely to present a public health concern.

Threshold of toxicological concern (TTC) approach for metabolites

The metabolites M320I04, M320I06 and M320I29 are unlikely to be genotoxic and could be assessed using the TTC approach (Cramer Class III threshold of 1.5 µg/kg bw per day).

The metabolite M320I04 was found in plant metabolism studies, present at 11-22% of the metaflumizone (E+Z) residues in cabbage and tomato; and 45% in cotton seed but at a low level (0.059 mg/kg). In all field trials, the residues of M320I04 did not exceed 20% of the metaflumizone (E+Z) residues. M320I04 was the major degradation product under baking, brewing, boiling simulation and represented up to 26% of applied radioactivity. The maximum IEDI (Annex 3) calculated for metaflumizone is 3.83 µg/kg bw. Based on the highest ratio between the metabolite and parent of 0.26 (simulated hydrolysis), the estimated maximum IEDI is 1.0 µg/kg bw.

The residues of M320I06 in the plant metabolism studies were much lower than M320I04. M320I06 was not found in either processing studies or supervised trials. M320I029 was only found in soil and not expected in plant commodities.

Therefore, the Meeting concluded that dietary exposure to residues of M320I04, M320I06 and M320I29 from uses considered by the JMPR would not be expected to be a safety concern.

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