METAFLUMIZONE (236)

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EXPLANATION

Metaflumizone, a new insecticidal active substance, is a broad-spectrum semicarbazone composed of two optical isomers in the ratio E : Z of 90 : 10. Residue and analytical aspects of metaflumizone were considered for the first time by the present meeting. The manufacturer submitted studies on animal and plant metabolism, environmental fate in soil, rotational crops, analytical methods, freezer storage stability, use patterns, supervised field trials on plants, processing and residues in animal commodities.

IDENTITY

Common name: Metaflumizone

Chemical name:

IUPAC: Active ingredient: Mixture of E- and Z-isomer:

(EZ)-2'-[2-(4-cyanophenyl)-1-(a,a,a-trifluoro-m- tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide

E-isomer:

(E)-2'-[2-(4-cyanophenyl)-1-(a,a,a-trifluoro-m- tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide

Z-isomer:

(Z)-2'-[2-(4-cyanophenyl)-1-(a,a,a-trifluoro-m- tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide

CA (index): Active ingredient: Mixture of E- and Z-isomer:

Hydrazinecarboxamide, 2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-N-[4-trifluoromethoxy)phenyl]-, (E+Z)- (9CI)

E-isomer:

Hydrazinecarboxamide, 2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-N-[4-(trifluoromethoxy)phenyl]- (9CI)

Z-isomer:

Hydrazinecarboxamide, 2-[2-(4-cyanophenyl)-1-[3-(trifluoromethyl)phenyl]ethylidene]-N-[4-(trifluoromethoxy)phenyl]-, (Z)- (9CI)

Manufacturer's code number: Metaflumizone is a mixture of the E- and the Z-isomer.

The mixture has the following codes:

BASF internal number: Reg.No. 4080134 (since 2000)
BAS 320 I (since 2000)

Former numbers: AC 836519 (until 2000)
CL 836519 (until 2000)

Each isomer is additionally coded separately:

E-isomer:

BASF internal number: Reg.No. 4102472 (since 2000)

Former number: CL 814027 (until 2000)

Z-isomer:

BASF internal number: Reg.No. 4102572 (since 2000)

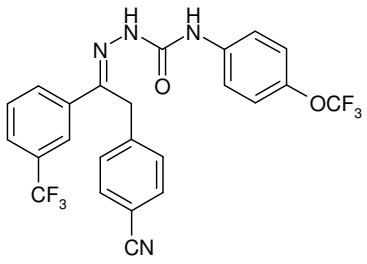
Former number: CL 399260 (until 2000)

CAS number: 139968-49-3

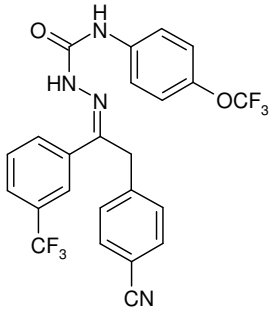
CIPAC number: not assigned

Molecular formula: C24H16F6N4O2

Structural formula: Metaflumizone is a mixture of the E- and the Z-isomer with a minimum E/Z-ratio of 9/1 (w/w).



BAS 320 I (*E*-isomer)



BAS 320 I (*Z*-isomer)

Molecular mass: 506.4

Formulations:

AlverdeSC		Suspension concentrate 240 g ai/L
Verismo	SC	Suspension concentrate 240 g ai/L
Altrevin	GB	Granular bait 0.063% ai
Siesta	GB	Granular bait 0.063% ai

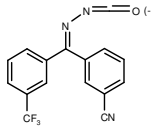
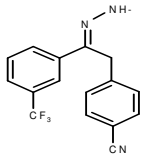
Physical and chemical properties

A detailed chemical and physical characterisation of the active ingredient is given in Table 1.

Table 1 Physical and chemical data of metaflumizone

Property	Test material, method	Results	Reference
Melting point of the purified and technical active substance[6]	Lot AC 12372-85: 96.3%, TC ai	1. melting peak: ca. 127 °C 2. melting peak: ca. 186 °C	2003/1006450 Kaestel 2003a
	Lot AC 12372-55: 97.8% (P ai as E,Z-mixture)	1. melting peak: ca. 133 °C 2. melting peak: ca. 188 °C	2003/1006454 Kaestel 2003b
Boiling point of purified active substance		Metaflumizone decomposes prior to boiling.	
Temperature at which decomposition or sublimation occurs	Lot AC 12372-85: 96.3% TC ai	Begin of decomposition: ca. 210 °C	2003/1006450 Kaestel 2003a
	Lot AC 12372-55: 97.8% (P ai as E,Z-mixture)	Begin of decomposition: ca. 232 °C	2003/1006454 Kaestel 2003b
Relative density of purified active substance	Lot AC 12372-85: 96.3%, TC ai	At 20 °C the density of metaflumizone TC is 1.461 g/cm³.	2003/1006450 Kaestel 2003a
	Lot AC 12372-55: 97.8%, (P ai as E,Z-mixture)	At 20 °C the density of metaflumizone P ai is 1.433 g/cm³.	2003/1006454 Kaestel 2003b
	AC 12145-19C: 98.7% (E-isomer, P ai)	At 20 °C the density of pure E-isomer of metaflumizone is 1.446 g/cm³.	2005/1010794 Kaestel 2005a
	AC 12411-4: 99.4% (Z-isomer, P ai)	At 20 °C the density of pure Z-isomer of metaflumizone is 1.461 g/cm³.	2005/1010796 Kaestel 2005b
Vapour pressure of purified active substance	AC 12611-17: 100% (P ai as E,Z-mixture)	Metaflumizone: 1.24E-08 Pa at 20 °C 3.41E-08 Pa at 25 °C. E-isomer: 7.94E-10 Pa at 20 °C 2.46E-09 Pa at 25 °C. Z-isomer: 2.42E-07 Pa at 20 °C 5.82E-07 Pa at 25 °C.	2004/5000782 Yacoub 2004
Henry's law constant	AC 12611-17: 100% (P ai as E,Z-mixture)	Value based on vapour pressure at 25 °C and water solubility at 25 °C, extrapolated: E-isomer H: 7.70×10^{-9} atm m³ mol^{-1} Z-isomer H: 1.05×10^{-6} atm m³ mol^{-1}	2003/5000574 Paulick 2003
Description of the physical state and colour	Lot AC 12372-85: 96.3%, TC ai	Metaflumizone TC is a white powder	2003/1006450 Kaestel 2003a
	Lot AC 12372-55: 97.8% (P ai as E,Z-mixture)	Metaflumizone P ai is a white powder	2003/1006454 Kaestel 2003b
Description of the odour - purified and technical active substance	Lot AC 12372-85: 96.3%, TC ai	Metaflumizone TC has a faint aromatic odour	2003/1006450 Kaestel 2003a
	Lot AC 12372-55: 97.8% (P ai as E,Z-mixture)	Metaflumizone P ai has a faint aromatic odour	2003/1006454 Kaestel 2003b
Spectra for purified active substance		All spectra were consistent with the structure of metaflumizone.	
UV/VIS	AC 12372-55: 97.8% (P ai as E,Z-mixture), AC 12145-19C: 98.7%	UV molecular extinction ε [l mol^{-1} cm^{-1}]: metaflumizone: 38 100 at 234 nm	HC-123-018 Huang 2001

[6] Reports 2003/1006450 and 2003/1006454 describe the test material has two melting peaks.This is not logical as a mixture of the metaflumizone E- and Z-isomer should have a melting range instead of two melting peaks.

Property	Test material, method	Results	Reference
	(E-isomer, P ai), AC 12411-4: 99.4% (Z-isomer, P ai)	19 300 at 280 nm E-isomer: 39 400 at 234 nm 20 800 at 285 nm Z-isomer: 39 400 at 236 nm 17 800 at 264 nm	
IR	AC 12372-55: 97.8% (P ai as E,Z-mixture), AC 12145-19C: 98.7% (E-isomer, P ai), AC 12411-4: 99.4% (Z-isomer, P ai)	Characteristic DRIFT vibrations : Vibration cm^{-1} chemical group 3500-2800 urea N-H; aromatic and alkanes- C-H 2232 cyano-group 1686, 1530 urea transition 1600, 1530, 1420 aromatic transition of p-disubstituted ring and C=C - vibrations	HC-123-018 Huang 2001
NMR	AC 12372-55: 97.8% (P ai as E,Z-mixture), AC 12145-19C: 98.7% (E-isomer, P ai), AC 12411-4: 99.4% (Z-isomer, P ai)	H-NMR: major characteristic shifts of metaflumizone in CD_3CN(TMS at 0 ppm) Chemical shift [ppm] Z-isomer E-isomer 8.29 (s) 9.60(s) 8.48 (s) 8.64 (s) 4.06 (s) 4.35 (s) 7.56 (broad s) 8.12 (broad s) 7.45 (d) 8.06 (d)	HC-123-018 Huang 2001
MS	AC 12372-55: 97.8% (P ai as E,Z-mixture), AC 12145-19C: 98.7% (E-isomer, P ai), AC 12411-4: 99.4% (Z-isomer, P ai)	Electrospray ionisation (ESI) key fragment ions: m/z assignment molecular formula 505 (M-H)- $C_{17}H_{15}F_6N_4O_2$  328 $C_{17}H_8F_3N_3O$  302 $C_{16}H_{11}F_3N_3$	HC-123-018 Huang 2001
Solubility of purified active substance in water	AC 12611-17: 100% (P ai as E,Z-mixture); AC 12145-19C: 98.7% (E-isomer, P ai); AC 12411-4: 99.4% (Z-isomer, P ai)	Solubility at 20 °C pH 5: 1.35 ppb pH 7: 1.81 ppb pH 9: 1.73 ppb deionized water: 1.79 ppb. The denoted water solubility values are a sum of both individual isomers.	HC-311-001 Yan 2001
Solubility in organic solvents at 15 to 25°C	AC 12372-85: 96.3%, TC ai	The solubility at 20 °C in various organic solvents was determined to be [g/100 mL solvent]: ai E- Z-isomer Acetone: 15.3 12.3 3.03 Acetonitrile : 6.30 4.67 1.63 Dichloromethane: 9.88 7.77 2.11 Ethyl acetate: 18.0 12.9 5.08 n-Hexane: 0.00085 0.0002 0.00065 Methanol : 1.40 1.06 0.35 Toluene : 0.40 0.26 0.14	2002/5003841 Holman 2002

Property	Test material, method	Results	Reference
		The ai is very soluble in acetone, acetonitrile, dichloromethane, and ethyl acetate, soluble in methanol and toluene, and sparingly soluble in n-hexane.	
Partition coefficient n-Octanol/water	AC 12372-85: 96.3%, TC ai	The log P_{OW} of metaflumizone was determined for each isomer at pH 5 and a temperature of 30 °C. Z-isomer: log K_{OW} 4.4 E-isomer: log K_{OW} 5.1	HC-123-028 Holman and Petry 2001
	L68-168: 99.2 % P ai (as E/Z-mixture) AC12145-19C: 98.7% P ai (E-isomer) 01893-152: 99.7% P ai (Z-isomer)	The log P_{OW} of metaflumizone was determined with a test substance containing both isomers as well as for each isomer separately at pH 3 and under neutral conditions and a temperature of 20 °C. Z-isomer: log P_{OW} 4.23 at pH 7 log P_{OW} 3.75 at pH 3 E-isomer: log P_{OW} 4.89 at pH 7 log P_{OW} 4.41 at pH 3 Metaflumizone can be considered as lipophilic	2006/1026196 Class 2006
Hydrolysis rate at pH 4, 7 and 9 under sterile and dark conditions	Benzonitrile ring-U-^{14}C (SS-14115): 95%, 259.46 uCi/mg; Trifluoromethoxyphenyl ring-U-^{14}C (AC 12694-75B: 97.6%, 277.80 uCi/mg	Hydrolysis of metaflumizone was studied in the dark at 25 °C in a sterile aqueous buffer solution at pH 4, pH 5, pH 7 and pH 9 for 30 days. The hydrolytic half –life was determined to be pH 4: $t_{1/2}$ ca.6 days pH 5: $t_{1/2}$ ca. 27-31 days pH 7 and pH 9: no degradation. The main hydrolytic metabolite is M320I04.	2004/7007518 Fang 2004
Phototransformation in water using artificial light (sterile)	SS14115 ([^{14}C]benzonitrile): 95.0%,specific activity 576000 dpm/ug; AC 12694-75B ([^{14}C]trifluoromethoxy-phenyl):97.6%, specific activity 616700 dpm/ug	Metaflumizone degrades extensively in water under photolytic conditions. In the irradiated trifuoromethoxyphenyl-labeled samples the parent decreased from 96.6% TAR to 15.0 % TAR at 15 DAT. The major transformation product detected was M320I05.	2003/5000571 Ta 2004a 2004/5000784 Ta 2004b
Quantum yield of direct phototransformation	SS14115 ([^{14}C]benzonitrile): 95.0%,specific activity 576000 dpm/ug; AC 12694-75B ([^{14}C]trifluoromethoxy-phenyl):97.6%, specific activity 616700 dpm/ug	The quantum yield of metaflumizone was calculated to be 3.23 x 10^{-8} mol Einstein^{-1}	2003/5000571 Ta 2004a 2004/5000784 Ta 2004b
Lifetime in the top layer of aqueous systems (calculated and real)	SS14115 (^{14}C-benzonitrile): 95.0%, specific activity 576000 dpm/ug; AC 12694-75B ([^{14}C]trifluoromethoxy-phenyl):97.6%, specific activity 616700 dpm/ug	The theoretical DT_{50} in the upper layer of natural water in central Europe was calculated from April to September (main application time), and ranged from 1.85 days (June) to 3.8 days (September).	2003/5000571 Ta 2004a 2004/5000784 Ta 2004b
Dissociation in water of purified active substance	AC 12372-55: 97.8% (P ai as E,Z-mixture), AC 12145-19C: 98.7% (E-isomer, P ai), AC 12411-4: 99.4% (Z-isomer, P ai)	Metaflumizone does not dissociate in water. At a concentration of 20 mg/L in a 50:50 acetonitrile: aqueous buffer at 20 °C over the pH range from 2–12 no significant spectral shifts were observed and therefore no pKa value could be determined.	HC-123-029 Petry 2001
Estimated photochemical oxidative degradation	not relevant	Calculated rate constant for the reaction of metaflumizone with OH radicals: k = 39.55 × 10^{-12} cm^3 x $molecule^{-1}$ × s^{-1} Calculated atmospheric degradation half-life of	2004/1015196 Hassink 2004

Property	Test material, method	Results	Reference
		metaflumizone: $t_{1/2}$ = 0.25 d (24 h day).	
Storage stability	Lot PF-01-02-Ve-1-3: 98.4%, TC ai	The ai was stored for 12 months at 20 and 30 °C in glass bottles. Assay results: Initially: 98.4% 20 °C storage: 98 .5% 30 °C storage: 99.0% No degradation after storage for 12 months.	2003/1021953 Koenig 2004

P ai: pure active ingredient

TC ai: technical material

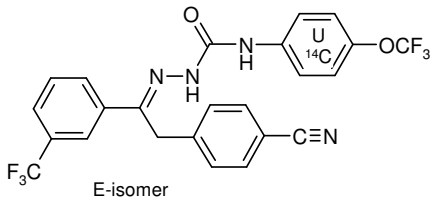
METABOLISM AND ENVIRONMENTAL FATE

Metaflumizone occurs in two isomeric forms (E/Z isomers) with an E : Z ratio of about 90 : 10. Both isomers can be separated with appropriate chromatographic methods. Although the E-isomer is approximately 10 times as active as the Z-isomer, for risk assessment, both isomers are considered as active ingredient.

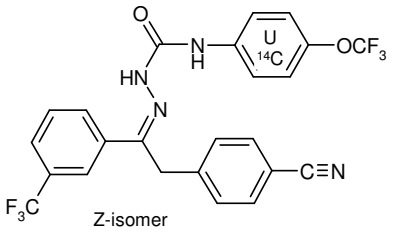
The metabolism and distribution of metaflumizone in plants and animals was investigated using the trifluoromethoxyphenyl-U-^{14}C- and benzonitrile-U-^{14}C-labelled compound.

The fate and behaviour of metaflumizone in the environment was investigated using the trifluoromethoxyphenyl-U-^{14}C-, benzonitrile-U-^{14}C- and trifluoromethylphenyl-U-^{14}C-labelled compound.

Metaflumizone; [trifluoromethoxyphenyl-U-^{14}C]-label

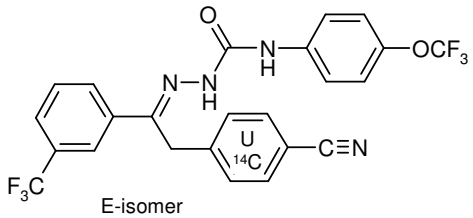


E-isomer

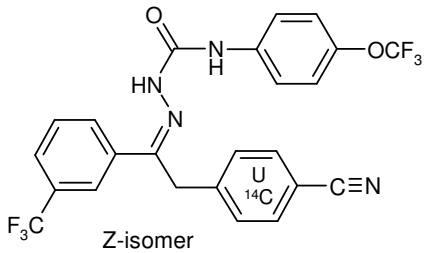


Z-isomer

Metaflumizone; [benzonitrile-U-^{14}C]-label

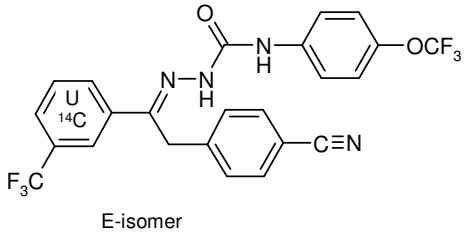


E-isomer

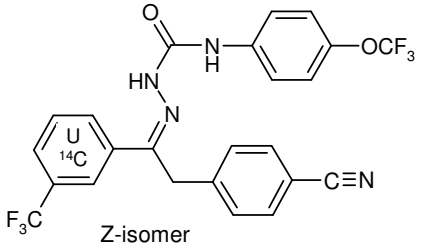


Z-isomer

Metaflumizone; [trifluoromethylphenyl-U-^{14}C]-label



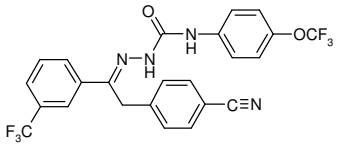
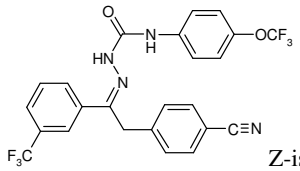
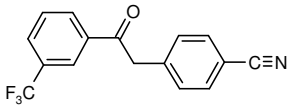
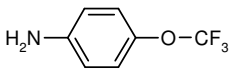
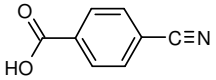
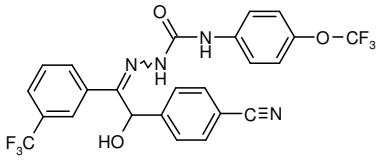
E-isomer

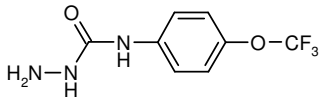
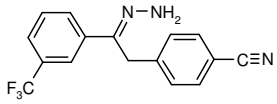
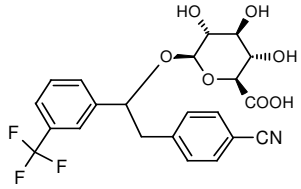
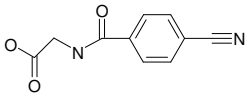
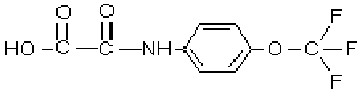
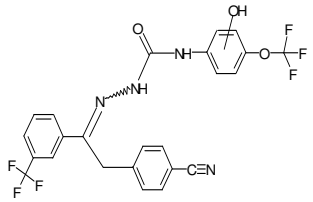
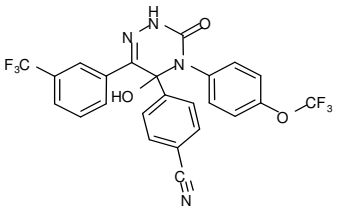
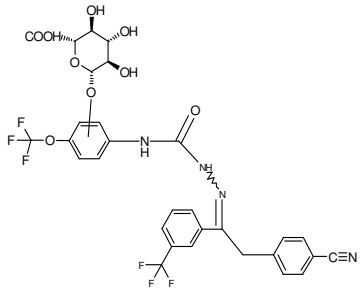
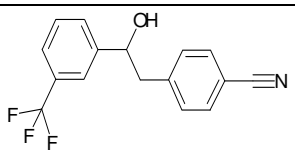


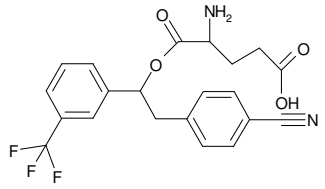
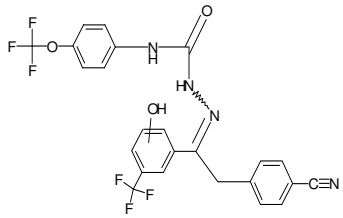
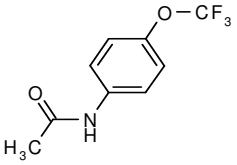
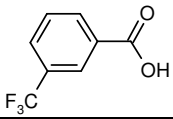
Z-isomer

Chemical names, structures and code names of metabolites and degradation products of metaflumizone are shown below.

Table 2 List of metabolites – sorted by chemical structures

Compound designation	Reference code (Reg.No.)	Molecular weight	Structure	Chemical name
BAS 320I Metaflumizone (E/Z 9:1) (AC 836519, M320I00)	243154	506.4	 E-isomer	(E)-2'-[2-(4-cyanophenyl)-1-(a,a,a-trifluoro-m-tolyl)ethylidene]-(trifluoromethoxy)carbanilohydrazide
E-isomer (M320I01, CL 814027)	4102472			
Z-isomer (M320I02, CL 399260)	4102572		 Z-isomer	(Z)-2'-[2-(4-cyanophenyl)-1-(a,a,a-trifluoro-m-tolyl)ethylidene]-4-(trifluoromethoxy)carbanilohydrazide
M320I04 (CL 397864) CAS 146653-56-7	4096485	289.26		4-{2-oxo-2-[3-(trifluoromethyl) phenyl]ethyl}benzonitrile
M320I05 (CL 65504) CAS 461-82-5	4094609	177.12		trifluoromethoxy aniline
M320I06 (CL 25945) CAS 619-65-8	121464	147.13		4-cyano benzoic acid
M320I07 (CL 1500789)	4725185	522.41		(E*Z*)-2-{2-(4-cyanophenyl)-2-hydroxy-1-[3-(trifluoromethyl phenyl]ethylidene}-*N*-[4-(trifluoromethoxy)phenyl] hydrazinecarboxamide

Compound designation	Reference code (Reg.No.)	Molecular weight	Structure	Chemical name
M320I08 (CL 952480) CAS 144172-28-1	4670704	235.00		N-[4-(trifluoromethoxy) phenyl]hydrazinecarboxamide
M320I09 (CL397865) CAS 139972-23-9	4102473	303.29		4-{(2E)-2-hydrazono-2-[3-(trifluoromethyl)phenyl]ethyl} benzonitrile
M320I10 (CL1023720)	4964515	476.4		(2S,3S,4S,5R,6R)-6-[2-(4-cyano-phenyl)-1-(3-trifluoromethyl-phenyl)-ethoxy]-3,4,5-trihydroxy-tetrahydro-pyran-2-carboxylic acid
M320I13 (CL269463)	n.a.	203.17		4-cyano-benzoylamino)-acetic acid
M320I17 (CL1023726)	n.a.	249.1		oxo{[4-trifluoromethoxy]-phenyl}amino} acetic acid
M320I22	n.a.			metaflumizone hydroxylated at the 3-fluoromethoxyphenyl ring
M320I23	4984051	520.39		4-{5-hydroxy-3-oxo-4-[4-(trifluoromethoxy)phenyl]-6-[3-(trifluoromethyl)phenyl]-2,3,4,5-tetrahydro-1,2,4-triazin-5-yl}benzonitrile
M320I24	n.a.			glucuronic acid conjugate of M3210I22
M320I25	n.a.	291.28		4-{2-hydroxy-2-[3-(trifluoromethyl) phenyl]ethyl}benzonitrile

Compound designation	Reference code (Reg.No.)	Molecular weight	Structure	Chemical name
M320I26	n.a.	420.39		2-Amino-pentanedioic acid 1-[2-(4-cyano-phenyl)-1-(3-trifluoromethyl-phenyl)-ethyl]ester
M320I27	n.a.			metaflumizone hydroxylated at the 3-fluoromethylphenyl ring
M320I28 (CL 271636)	4457768	219.16		N-[4-(trifluoromethoxy) phenyl]acetamide
M320I29 (CL 2862) CAS 454-92-2	43455	190.12		m-trifluoromethyl benzoic acid

Animal metabolism

The metabolism of metaflumizone has been studied in laboratory rats, goats and hens. Rat metabolism studies were evaluated by the WHO Core Assessment Group of the 2009 JMPR. A short summary of the rat metabolism is given in this section.

Rats

Metaflumizone was extensively metabolized via hydroxylation of the aniline or benzonitrile ring and hydrolysis of the central hydrazine carboxamide group to yield the aniline derivatives and phenacylbenzoylnitrile derivatives. The trifluoromethoxyaniline was acylated and further oxidized to form derivatives of malonic and oxalic acids. The ring hydroxylated derivatives were readily conjugated with sulphate or glucuronic acid. Glycine conjugation occurred at the carboxyl group of the cyanobenzoic acid, whereas glutathione conjugation occurred by displacement of one of the fluorine atoms of the trifluoromethyl or trifluoromethoxy group to form S-(N-(N-γ-glutamyl))-cysteinyl-, glycyl-conjugate and subsequent hydrolysis to cystein-conjugates.

Lactating goats

Metaflumizone was administered to lactating goats by gavage daily on 14 consecutive days corresponding to a nominal dose level of 12 mg/kg feed (Beimborn and Leibold 2004, 2004/1005042). The study was performed with two ^{14}C-labelled test substances: one labelled in the trifluoromethoxy-anilino-ring (T-label) and the other in the benzonitrile-ring (B-label). Two goats were dosed per label.

With both labels the total recoveries of radioactivity were in the range of 81–90% (see Tables 3 and 4). Excretion mainly occurred via the faeces, which contained 66–77% of the administered T-labelled [^{14}C]metaflumizone and 76–79% of the administered B-labelled ^{14}C-metaflumizone. In urine,

about 2.5–2.9% (T-label) and 4.1–5.0% (B-label) of the administered dose were found. Radioactivity recovered from urine and faeces together with cage wash amounted to 85–93% (T-label) and to 92–93% (B-label). Radioactivity in milk amounted to 0.87–0.96% (T-label) and to 1.47% (B-label) of the radioactivity administered. Within the T-label the concentration of radioactive material in milk increased through the 12th day in one goat and then plateaued and increased again on the last day of the study. The other goat of the T-label experienced a continuous increase in milk radioactive residue concentration throughout the 14 day study. Concentrations of radioactivity of the B-label in milk generally increased during the first 10–11 days of the application period, decreased during the following 2–3 days, and increased again on day 14.

Table 3 Balance total radioactive residues (TRR) of [^{14}C]metaflumizone in goats (T-label) (Beimborn and Leibold 2004, 2004/1005042)

Matrix	Animal 1		Animal 2	
	% Total dose	mg/kg	% Total dose	mg/kg
Urine day 1	0.12	0.14	0.11	0.19
2	0.10	0.24	0.14	0.31
3	0.12	0.18	0.12	0.27
4	0.16	0.39	0.15	0.35
5	0.17	0.33	0.16	0.37
6	0.31	0.47	0.30	0.55
7	0.17	0.33	0.20	0.4
8	0.18	0.29	0.25	0.47
9	0.20	0.47	0.22	0.55
10	0.18	0.39	0.22	0.56
11	0.20	0.36	0.18	0.58
12	0.21	0.39	0.31	0.57
13	0.21	0.34	0.24	0.49
14	0.21	0.52	0.25	0.59
Subtotal urine	2.54		2.85	
Faeces day 1	4.15	4.8	0.51	1.1
2	3.97	7.9	3.37	8.3
3	4.48	7.5	4.00	10.2
4	3.95	9.0	2.54	7.5
5	7.80	13.2	3.75	9.5
6	6.15	6.7	5.07	10
7	4.27	6.6	4.26	8.3
8	6.69	9.4	5.65	8.8
9	4.42	6.5	5.64	9.5
10	4.06	5.6	6.55	10.4
11	4.77	8.9	3.75	8.3
12	8.48	8.6	6.34	9.8
13	8.39	7.8	9.37	11.6
14	5.86	8.6	5.37	8.2
Subtotal faeces	77.44		66.17	
Milk day 1	0.02	--	0.02	--
2	0.04	--	0.02	--
3	0.07	--	0.02	--
4	0.05	--	0.03	--
5	0.04	--	0.05	--
6	0.05	--	0.06	--
7	0.06	--	0.07	--
8	0.05	--	0.07	--
9	0.06	--	0.09	--
10	0.08	--	0.09	--
11	0.08	--	0.07	--
12	0.11	--	0.14	--
13	0.08	--	0.12	--

Matrix	Animal 1		Animal 2	
	% Total dose	mg/kg	% Total dose	mg/kg
14	0.08	--	0.11	--
Subtotal milk	0.87		0.96	
Blood	0.08	0.09	0.10	0.08
Liver	0.46	1.3	0.58	1.3
Bile	0.05	1.4	0.01	1.4
Gut	0.28	0.2	0.43	0.26
Gut contents	3.53	1.8	2.97	1.3
Stomach	0.04	0.02	0.30	0.13
Stomach contents	0.07	0.01	6.46	0.6
Kidney	0.01	0.21	0.02	0.21
Adipose tissue	0.09	0.73	0.04	0.73
Muscle	0.10	0.07	0.17	0.07
Cage wash	0.07	--	0.07	--
Total	85.66	--	81.12	--

Table 4 Balance total radioactive residues (TRR) of [^{14}C]metaflumizone in goats (B-label) (Beimborn and Leibold 2004, 2004/1005042).

Matrix		Animal 3		Animal 4	
		% Total dose	mg/kg	% Total dose	mg/kg
Urine	day 1	0.11	0.16	0.00	< 0.01
	2	0.21	0.48	0.34	1.1
	3	0.19	0.53	0.26	1.4
	4	0.27	0.64	0.37	1.7
	5	0.24	0.43	0.11	2.0
	6	0.35	0.76	0.95	2.9
	7	0.21	0.62	0.38	2.3
	8	0.24	0.50	0.39	3.2
	9	0.26	0.75	0.35	2.8
	10	0.35	1.6	0.32	1.7
	11	0.37	0.77	0.34	1.3
	12	0.39	1.1	0.31	1.2
	13	0.45	1.29	0.44	1.5
	14	0.43	0.55	0.41	1.3
Subtotal urine		4.07		4.97	
Faeces	day 1	0.43	0.59	0.07	0.23
	2	4.82	8.8	5.45	9.3
	3	4.48	7.9	3.36	7.1
	4	6.18	8.0	4.34	8.4
	5	5.25	8.7	5.32	10.2
	6	7.41	10.0	5.59	7.8
	7	3.64	5.2	5.85	13.2
	8	3.51	6.7	6.15	16.2
	9	4.63	6.4	7.71	18.5
	10	5.44	6.2	7.10	14.8
	11	6.27	7.3	6.54	11.2
	12	6.20	7.5	4.91	7.3
	13	8.49	10.4	8.20	11.6
	14	8.80	8.9	8.65	12.0
Subtotal faeces		77.55		79.24	
Milk	day 1	0.01	--	0.01	--
	2	0.04	--	0.04	--
	3	0.03	--	0.03	--
	4	0.04	--	0.05	--
	5	0.05	--	0.07	--

Matrix	Animal 3		Animal 4	
	% Total dose	mg/kg	% Total dose	mg/kg
6	0.07	--	0.05	--
7	0.05	--	0.11	--
8	0.08	--	0.13	--
9	0.07	--	0.16	--
10	0.15	--	0.22	--
11	0.21	--	0.19	--
12	0.16	--	0.10	--
13	0.12	--	0.11	--
14	0.39	--	0.20	--
Subtotal milk	1.47		1.47	
Blood	0.07	0.13	0.03	0.06
Liver	0.86	2.8	0.81	2.8
Bile	0.05	2.0	0.06	2.0
Gut	0.22	0.18	0.17	0.13
Gut contents	2.43	1.2	2.33	1.30
Stomach	0.26	0.17	0.28	0.15
Stomach contents	1.16	0.24	0.31	0.06
Kidney	0.02	0.38	0.02	0.38
Adipose tissue	0.11	3.6	0.10	3.6
Muscle	0.25	0.14	0.31	0.14
Cage wash	0.09	--	0.17	--
Total	86.63	--	90.29	--

The metabolism part of the study was carried out by Fabian and Knoell 2004, 2003/1019889. At sacrifice, highest concentrations of radioactivity were found in bile, liver, adipose tissue, and contents of the GI-tract. With the exception of the GI-tract, about 0.79–0.92% (T-label) to 1.33–1.36% (B-label) of the administered dose could be found in the organs and tissues examined. The methanol-extractable radioactive residue was 39.4% and 32.1% of the TRR for liver, 75.6% and 82.8% of the TRR for kidney, 84.8% and 94.2% of the TRR for muscle, and 83.0% and 107.9% of the TRR for fat, T-label and B-label, respectively (see Table 5).

Table 5 Extractability of [^{14}C]metaflumizone residues in goat matrices (Fabian and Knoell 2004, 2003/1019889)

Matrix	TRR		Methanol [a]		Other solvent [b]		ERR [c]		PES [d]		Recov. [e]
	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	%
T-label											
Milk [f]	0.2	100.0	0.20	101.9	--	--	0.20	101.9	< 0.01	0.9	102.8
Liver	1.3	100.0	0.51	39.4	0.01	0.6	0.52	40.0	0.77	60.0	100.0
Kidney	0.2	100.0	0.16	75.6	< 0.01	2.0	0.16	77.6	0.05	22.4	100.0
Muscle	0.07	100.0	0.06	84.8	< 0.01	1.9	0.06	86.7	0.01	13.2	100.0
Fat	0.73	100.0	0.61	83.0	0.02	2.5	0.62	85.5	0.11	14.5	100.0
Bile	1.4	100.0	--	--	--	--	--	--	--	--	--
Faeces	1.6	100.0	1.5	95.7	--	--	1.5	95.7	0.12	7.5	103.2
Urine	0.43	100.0	--	--	--	--	--	--	--	--	--
B-label											
Milk	0.53	100.0	0.48	91.1	--	--	0.48	91.1	< 0.01	0.3	91.4
Liver	2.8	100.0	0.91	32.1	0.04	1.4	0.95	33.5	1.9	66.5	100.0
Kidney	0.38	100.0	0.32	82.8	0.01	1.7	0.32	84.5	0.06	15.5	100.0
Muscle	0.18	100.0	0.17	94.2	--	--	0.17	94.2	0.01	3.6	97.8
Fat	2.9	100.0	3.1	107.9	0.05	1.8	3.2	109.7	0.02	0.5	110.2
Bile	2.0	100.0	--	--	--	--	--	--	--	--	--

Matrix	TRR		Methanol [a]		Other solvent [b]		ERR [c]		PES [d]		Recov. [e]
	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	%
Faeces	1.6	100.0	1.6	96.8	--	--	1.6	96.8	0.12	7.2	104.0
Urine	0.99	100.0	--	--	--	--	--	--	--	--	--

[a] solvent 1: methanol

[b] other solvent: liver (Label T): water

kidney and muscle (Label T): acetone, ethylacetate, DCM, water

fat (Label T): iso-hexane, acetone, ethylacetate, DCM, water

liver and kidney (Label B): water

fat (Label B): acetonitrile, iso-hexane, ethylacetate

[c] ERR: extractable radioactive residue (sum of solvents 1, 2, and others)

[d] PES: post-extraction solid: calculated for liver, kidney, muscle, fat (Label T), and liver and kidney (Label B)

[e] Recovery: sum of all extracts and the residue

[f] Milk (Label T): combined methanol extract calculated (sum of extracts)

Enzymatic digestion with pronase released, further methanol extraction of the remaining residue and a microwave treatment in sum released 51.5% (T-label) and 57.2% (B-label) of liver non-extracted residue. Kidney non-extracted residue was also digested with pronase, releasing 17.2% (T-label) and 14.4% (B-label) of the TRR. For muscle and fat (Label T), pronase digestion released 9.2% and 3.1%, respectively (see Table 6).

Table 6 Summary of released non-extracted radioactivity (Fabian and Knoell 2004, 2003/1019889)

Matrix	PES		Pronase digestion		Methanol extract		Micro-wave extract		Final residue		Recovery
	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	%
T-label											
Liver	0.77	60.0	0.26	20.4	0.26	20.1	0.14	11.0	0.06	4.6	93.5
Kidney	0.05	22.4	0.04	17.2	-	-	-	-	0.01	2.9	89.7
Muscle	0.01	13.2	0.01	9.2	-	-	-	-	0.002	3.6	97.0
Fat	0.11	14.5	0.02	3.1	-	-	-	-	0.01	1.2	29.7
B-label											
Liver	1.9	66.5	0.86	30.2	0.6	20.9	0.17	6.1	0.15	5.2	93.8
Kidney	0.06	15.5	0.06	14.4	-	-	-	-	0.02	6.0	131.6

In a separate experiment, the non-extracted residues of liver Label T and B were treated by micro-wave under the addition of acetonitrile and organic acid (formic acid or acetic acid) for 0.5 h at elevated temperatures (150 °C). With this technique it was possible to solubilize 37.2% and 63.5% of the TRR, Label T and B, respectively. In a second experiment, liver homogenate was directly subjected to micro-wave treatment which solubilized 82.5% and 85.3% of the TRR, Label T and B, respectively.

Kidney non-extractable residue was also digested with Pronase, releasing 17.2% and 14.4% of the TRR, Label T and B, respectively. For muscle and fat (Label T), Pronase digestion released 9.2% and 3.1%, respectively. Table 7 shows the components indentified in goat matrices.

Table 7 Summary of identified components in goat matrices (Fabian and Knoell 2004,2003/1019889)

Metabolite code	Milk mg/kg (% TRR)	Liver mg/kg (% TRR)	Kidney mg/kg (% TRR)	Muscle mg/kg (% TRR)	Fat mg/kg (% TRR)	Bile mg/kg (% TRR)	Faeces mg/kg (% TRR)	Urine mg/kg (% TRR)
T-label								
M320I17	-	-	-	-	-	-	-	0.23 (53)
M320I04	-	-	-	0.006 (9.3)	-	-	-	-
M320I24	-	0.05 (3.9)	0.005 (2.3)	-	-	-	-	-
M320I07	-	0.006 (0.5)	-	-	-	-	-	-
M320I22	-	-	-	-	-	0.026 (1.8)	0.94 (58)	-
M320I23	-	0.014 (1.0)	-	-	-	-	-	-
M320I24	-	-	-	-	-	1.3 (90)	-	-
M320I25	-	0.05 (3.9)	0.005 (2.3)	-	-	-	-	0.07 (16)
M320I26	-	0.048 (3.7)	-	-	-	-	-	-
M320I28	-	0.11 (8.9)	-	-	-	-	-	-
metaflumizone E- +Z-isomer	0.13 (68)	0.015 (1.1)	0.13 (61)	0.045 (65.2)	0.58 (80)	0.09 (6.4)	0.6 (37)	-
B-label								
M320I04	-	-	-	0.003 (1.4)	-	-	-	-
M320I06	-	-	-	-	-	-	-	0.043 (4.3)
M320I07	-	0.014 (0.5)	-	-	-	-	-	-
M320I10	-	-	0.003 (0.7)	-	-	-	-	0.123 (12.3)
M320I13	-	0.057 (2.0)	-	-	-	-	-	0.130 (13.0)
M320I22	-	-	0.006 (1.8)	-	-	-	0.820 (51.0)	-
M320I23	-	0.023 (0.8)	-	-	-	-	-	-
M320I24	-	0.049 (1.8)	-	-	-	1.796 (89.4)	-	-
M320I25	-	0.561 (19.7)	0.029 (7.7)	< 0.001 (0.1)	-	0.005 (0.3)	0.034 (2.1)	0.500 (50.0)
M320I26	-	0.320 (11.2)	0.011 (2.8)	-	-	0.018 (0.9)	-	-
metaflumizone E- +Z-isomer	0.469 (88.4)	0.879 (30.9)	0.303 (79.2)	0.164 (91.1)	3.099 (107.9)	0.061 (3.1)	0.703 (43.7)	-

The metabolism of metaflumizone in lactating goats followed two different paths. One route was cleavage of the molecule at the imine-bridge resulting in the formation of M320I04 and the trifluoromethoxyaniline. M320I04 was either cleaved, oxidized and conjugated with glycine to M320I13 or reduced and conjugated with glucuronic acid (M320I10) or glutamic acid (M320I26). The main route involved hydroxylation of the parent compound at the trifluoromethoxyaniline ring, followed by conjugation to glucuronic acid. The hydroxylation at the benzyl-position of the molecule was followed by oxidation and ring formation to M320I23 (see Figure 1).

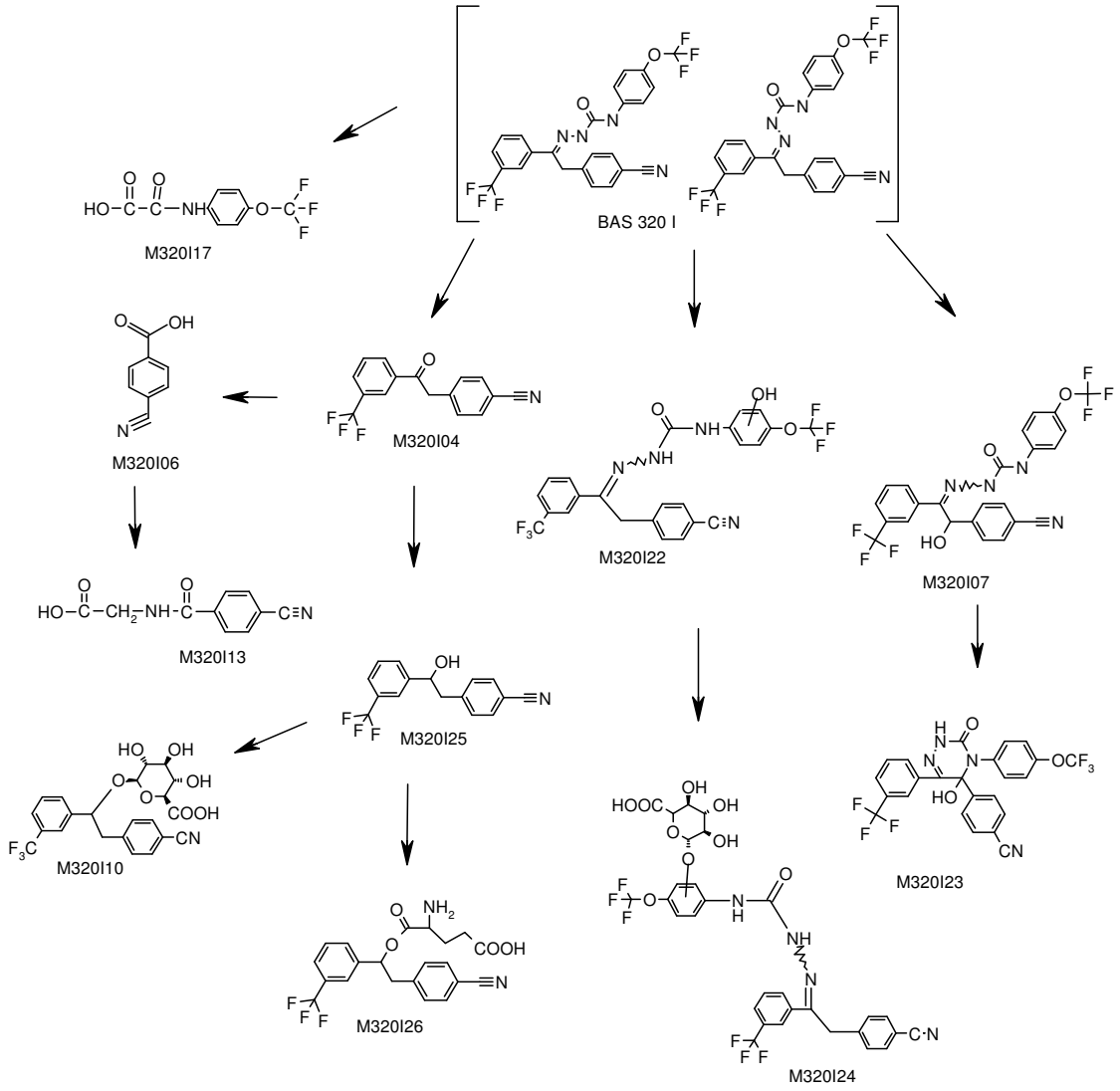


Figure 1 Metaflumizone metabolic pathway in lactating goat (Beimborn and Leibold 2004, 2004/1005042; Fabian and Knoell 2004, 2003/1019889)

Laying hens

The absorption, distribution, excretion of metaflumizone in laying hens was studied by Beimborn and Leibold 2003, 2004/1010610. The metabolism part of the study was carried out by Fabian and Glaesgen 2004, 2004/1010609. The study was performed with two ^{14}C-labelled test substances: one labelled in the benzonitrile-ring (B-label) and the other in the trifluoromethoxyphenyl-ring (T-label). The test substance was administered by gavage daily for 14 consecutive days to two groups of 12 laying hens each, at a nominal dose equivalent to 12 mg/kg feed. The mean concentrations were 13.4 g/kg feed (label B) and 13.9 mg/kg feed (label T), corresponding to daily means of 0.90 mg/kg body weight for label B and 0.89 mg/kg body weight for label T, respectively. With both labels the total recoveries of radioactivity were in the range of 70% of the administered dose (Table 8).

Absorbed metaflumizone showed residues in organs and tissues amounting to 4.6 mg/kg or 3.7 mg/kg (B-label or T-label, respectively) for liver, 1.1 mg/kg or 1.2 mg/kg for muscle, and 27 mg/kg or 23 mg/kg for fat. Eggs contained approximately 6% of the administered metaflumizone

(2.8 mg/kg or 2.6 mg/kg), and 53 to 59% of the applied dose were recovered in the excreta (Tables 8 and 9).

Table 8 Balance for T- and B-label in after dosing of laying hens with [^{14}C]metaflumizone (Beimborn and Leibold 2003; 2004/1010610).

Matrix	Application day	T-label		B-label	
		% Total dose	mg/kg	% Total dose	mg/kg
Excreta	1	2.59	2.1	1.83	1.7
	2	2.32	2.7	2.01	2.5
	3	3.27	3.3	2.59	2.5
	4	2.86	2.4	2.65	2.4
	5	3.72	4.3	2.94	4.2
	6	4.50	4.0	4.62	3.7
	7	4.43	4.6	3.54	4.6
	8	5.05	4.1	4.77	4.3
	9	4.55	5.1	4.15	4.9
	10	5.00	4.5	3.96	3.6
	11	5.01	4.5	5.23	4.6
	12	4.82	5.9	3.95	4.9
	13	4.54	5.2	4.89	5.5
	14	6.22	5.2	5.99	5.2
Subtotal excreta		58.88		53.12	
Eggs	1	0.00	< 0.01	0.00	< 0.01
	2	0.03	0.13	0.03	0.13
	3	0.06	0.33	0.08	0.38
	4	0.14	0.64	0.17	0.75
	5	0.21	1.1	0.24	1.2
	6	0.34	1.6	0.39	1.6
	7	0.42	1.9	0.47	2.2
	8	0.58	2.6	0.49	2.4
	9	0.57	2.6	0.51	2.6
	10	0.61	2.8	0.74	3.1
	11	0.66	3.0	0.76	3.3
	12	0.78	3.3	0.78	3.3
	13	0.64	3.7	0.86	3.7
	14	0.71	3.8	0.83	4.0
Subtotal eggs		5.75		6.35	
Blood		0.19	1.2	0.14	1.1
Liver		0.62	3.7	0.76	4.6
GI-tract (skin)		1.72	1.8	2.41	2.6
GI-tract (contents)		0.13	0.69	0.10	0.86
Muscle		1.88	1.2	1.75	1.1
Adipose tissue		4.52	23	5.24	27
Subtotal organs		9.06		10.40	
Cage wash		0.12	--	0.11	--
Total		73.80	--	69.97	--

Table 9 Extractability of [^{14}C]metaflumizone residues in hen matrices (Fabian and Glaesgen 2004, 2004/1010609)

Matrix	TRR		ERR		PES		Recovery
	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	%
B-label							
Egg	2.8	100.0	2.7	97.8	0.08	3.0	100.8
Liver	4.6	100.0	3.1	66.1	1.7	36.1	102.2
Muscle	1.1	100.0	1.2	108.2	0.02	2.1	110.3

Matrix	TRR		ERR		PES		Recovery
	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	%
Fat	27	100.0	28	103.7	0.13	0.5	104.2
Excreta	3.0	100.0	2.8	93.0	nd	nd	nd
T-label							
Egg	2.6	100.0	2.5	95.3	0.05	1.8	97.1
Liver	3.7	100.0	3.4	92.3	0.38	10.2	102.5
Muscle	1.2	100.0	1.2	102.3	0.02	1.7	104.0
Fat	23	100.0	25	107.4	0.04	0.2	107.6
Excreta	2.9	100.0	2.7	93.1	nd	nd	nd

nd: not detected

EER: extractable radioactive residues

PES: post-extraction solid

The relevant residue in organic extracts of egg, liver, muscle and fat was the parent compound. The metabolite M320I04 was found in minor portions in extracts of egg and excreta (label B). Additionally, considerable amounts of the hydroxylated metabolite M320I27 were detected in excreta (see Table 10). In the non-extracted residues of liver, two additional metabolites M320I25 and M320I26 were identified after pronase digestion (B-label). Furthermore, the non-extracted residues of liver (T-label) could be converted into the detectable hydrolysis product M320I28 by a microwave treatment in the presence of acetic acid at 150 °C.

Table 10 Summary of identified extractable components in poultry matrices (Fabian and Glaesgen 2004, 2004/1010609).

Metabolite code	Egg		Liver		Muscle		Fat		Excreta	
	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR
B-label										
M320I04	0.04	1.5	-	-	-	-	-	-	-	-
M320I27	-	-	-	-	-	-	-	-	0.54	18.1
Parent (E / Z – Isomers)	2.6	93.4	2.6	56.4	1.1	96.4	28.2	104.2		
T-label										
M320I27	-	-	-	-	-	-	-	-	0.51	17.4
M321I28	-	-	0.66	17.9	-	-	-	-	-	-
Parent (E / Z – Isomers)	2.4	89.3	2.9	79.0	1.1	90.4	24.4	106.0	-	-

The parent compound metaflumizone was metabolized via two routes (see Figure 2). The cleavage of the molecule at the imine-bridge resulted in the formation of the metabolite M320I04. Metabolite M320I04 was reduced to M320I25 and conjugated with glutamic acid to yield M320I26. The hydroxylation of the parent compound at the 3 trifluoromethylphenyl moiety resulted in the formation of the metabolite M320I27 that was identified in excreta.

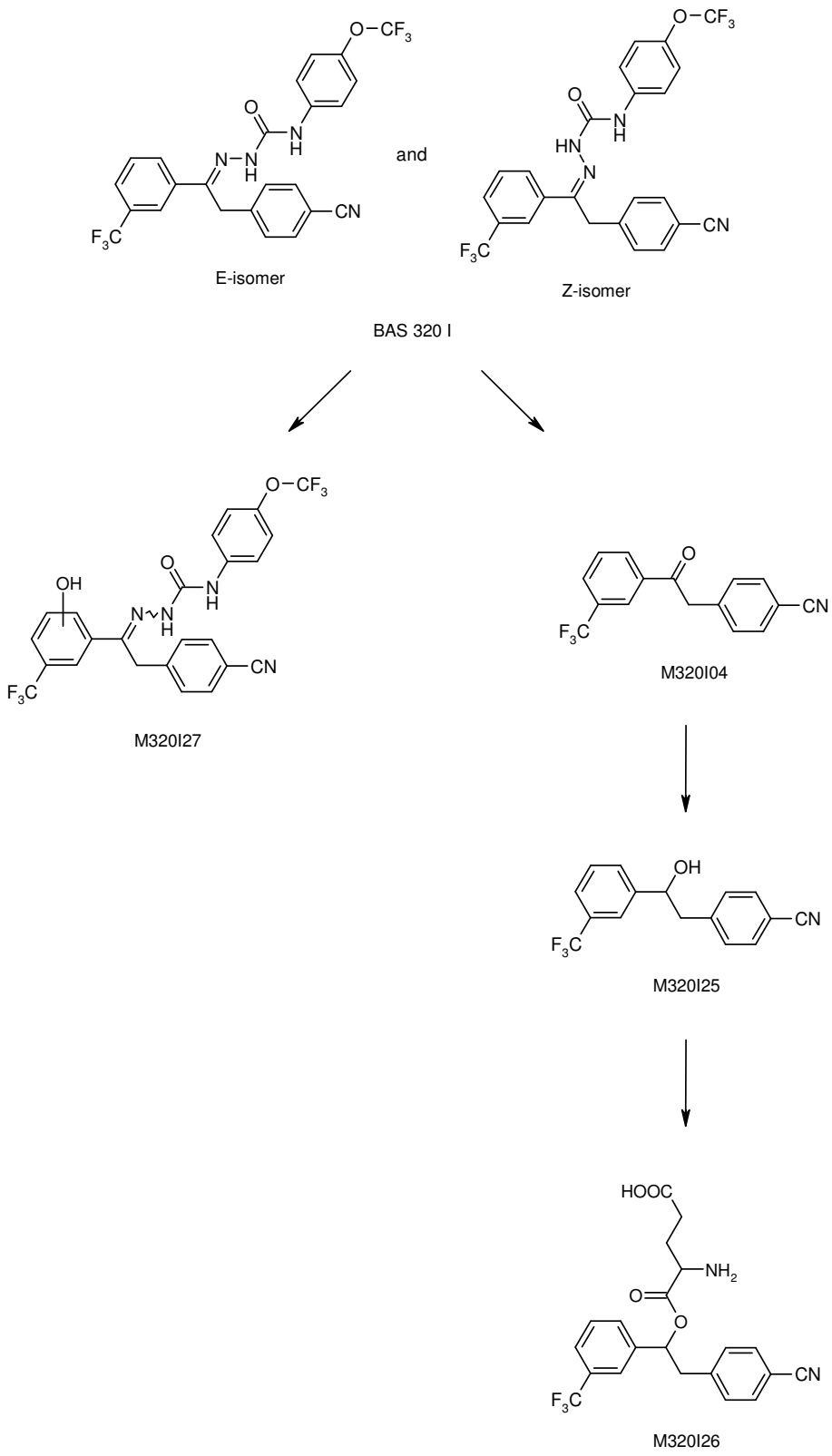


Figure 2 The metabolic pathway of metaflumizone in hens (Beimborn and Leibold 2003, 2004/1010610; Fabian and Glaesgen 2004, 2004/1010609)

Plant metabolism

Plant metabolism studies were performed on white cabbage (0 to 7 days PHI), tomato (0 and 7 days PHI) and cotton (21 days PHI) using the benzonitrile- and trifluoromethoxyphenyl-U-^{14}C-labelled metaflumizone (B- and T-label). The cabbage study was conducted at 4 × 0.28 kg ai/ha. The rates of application for the cotton and the tomato study (under both field and glasshouse conditions) were 6 × 0.34 kg ai/ha.

White cabbage

The white cabbage metabolism study (Rabe and Glaesgen 2004, 2004/1000747) was conducted with [^{14}C]metaflumizone after post emergence spray application under greenhouse conditions at a rate of four times 0.28 kg ai/ha, taking place on the 106, 113, 120, and 127th day after planting. Samples of cabbage leaf were taken on the final application day (after drying of the spray), as well as 3 and 7 days after the last treatment. Samples were then stored at -18 °C or colder.

The total radioactive residues (TRR) in white cabbage leaf were determined by direct combustion analysis of small aliquots of homogenized sample material (see Table 11) as well as by summarizing the extractable radioactive residues (ERR) and the non-extracted radioactive residues (NER) (see Table 12). In some cases, the results of replicate combustion analyses varied due to the inhomogeneity of the sample material and the limited amounts used for combustion. Therefore, it was decided to use the TRR values calculated as the sum of ERR and NER as 100% TRR for all further calculations.

The calculated TRR of white cabbage leafs harvested seven days after the last application of [^{14}C]metaflumizone amounted to 13.8 mg/kg for the B-label and 14.7 mg/kg for the T-label. In white cabbage leaf sampled three days after the last treatment, the residues accounted for 9.7 mg/kg for the B-label or 14.1 mg/kg for the T-label. In white cabbage leaf sampled on the day of the last application, the residues were determined only by direct combustion analysis to account for 11.7 mg/kg with the B-label or 12.4 mg/kg with the T-label. A comparison of the two labels showed slightly higher TRR values for the T-label compared to the B-label (see Table 11).

Table 11 Total radioactive residues in white cabbage after post emergence treatment with [^{14}C]metaflumizone (Rabe and Glaessgen 2004, 2004/1000747)

Matrix	DAT[a]	TRR determined by direct combustion [mg/kg]	TRR calculated[b] [mg/kg]
B-label			
White cabbage leaf	7	10.0	13.8
White cabbage leaf	3	11.2	9.7
White cabbage leaf	0	11.7	na[c]
T-label			
White cabbage leaf	7	11.3	14.7
White cabbage leaf	3	11.8	14.1
White cabbage leaf	0	12.4	na

[a] DAT: days after last treatment

[b] TRR: total radioactive residues, were calculated as the sum of ERR + PES

[c] na: not applicable

The homogenized plant material was extracted three times with methanol and subsequently two times with water (see Table 12). The extractability of the radioactive residues of metaflumizone in white cabbage leaf was very good for both labels with portions of 99.2% TRR extracted from white cabbage leaf harvested seven days after the last application (both labels) or 99.4% TRR extracted from white cabbage leaf sampled three days after the last treatment. The non-extracted radioactive residues (NER) were low in white cabbage leaf samples for both labels, representing 0.8% TRR,

seven days after the last treatment. No further characterization was carried out for the residual radioactive residues because of the low residue levels.

Table 12 Extractability of radioactive residues in white cabbage after post emergence treatment with [^{14}C]metaflumizone (Rabe and Glaessgen 2004, 2004/1000747)

Matrix	DAT	TRR calc.	Methanol		Water		ERR		PES	
		mg/kg	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg	%TRR
B-label										
Leaf	7	13.8	13.6	98.7	0.07	0.5	13.7	99.2	0.11	0.8
Leaf	3	9.7	9.6	98.9	0.05	0.5	9.6	99.4	0.06	0.6
T-label										
Leaf	7	14.7	14.5	98.9	0.04	0.3	14.6	99.2	0.12	0.8
Leaf	3	14.1	14	99.1	0.04	0.3	14.0	99.4	0.09	0.6

DAT: days after last treatment

TRR: was calculated as the sum of ERR + PES

ERR: extractable radioactive residue

PES: post extraction solids

To address the extractability with solvents used in residue analysis methods, further extraction procedures were carried out. The radioactive residues extracted with the different extraction procedures are summarized and compared (see Table 13). In the case of the benzonitrile label, 94.1% of the ERR determined during the metabolism study were extracted with methanol /water (70:30,v/v), and 96.9% ERR were extracted with methanol/water/2N HCI (70:25:5, v/v/v). For the trifluoromethoxyphenyl label, 70.9% of the ERR obtained were extracted with methanol/water (70:30, v/v), and 67.1% ERR were extracted with methanol/water/2N HCI (70:25:5, v/v/v). After acidification of the solvent with hydrochloric acid, a slight increase of the extractability was observed only in the case of the benzonitrile label.

Table 13 Extractability of white cabbage leaf samples after post emergence treatment with [^{14}C]metaflumizone with other solvents (Rabe and Glaessgen 2004, 2004/1000747)

Matrix	DAT	Work up procedure (3 * MeOH, 2 * H_2O)		First extraction procedure			Second extraction procedure		
		TRR mg/kg	ERR mg/kg	MeOH + H_2O 70:30 (v/v)			MeOH + H_2O + 2N HCl 70:25:5 (v/v)		
				mg/kg	% TRR	% ERR	mg/kg	% TRR	% ERR
B-label									
Leaf	7	13.8	13.7	12.9	93.3	94.1	13.3	96.1	96.9
T-label									
Leaf	7	14.7	14.6	10.3	70.3	70.9	9.8	66.6	67.1

DAT: days after last treatment

The nature of the residues of metaflumizone in the extracts was investigated by HPLC analysis and by LC MS/MS identification of isolated metabolites. The results are shown in Table 14. In methanol extracts portions above 75% of the total radioactive residues were still present as E- or Z-isomers of the active substance at the time of harvest. Summaries of the amounts of identified metabolites are given in Table 14 for the B-label and for the T-label. The parent compound, which includes the E and Z isomers, constituted 77.6% TRR (7 DAT) and 75.5% TRR (3 DAT) for the B-label and 98.3% TRR (7 DAT) and 77.4% TRR (3 DAT) for the T-label. The major metabolite found in white cabbage leaf is the degradation product M320I04 (15.1% TRR at 7 DAT and 16.0% at 3 DAT). According to its structure, this metabolite is only detectable with the B-label. A further transformation product occurring in minor amounts is the hydroxylated metabolite M320I07 (3.2% at 7 DAT and 2.2% at 3 DAT). The cyclic derivative M320I23, which was detected only in low

concentrations, was formed by ring closure of the metabolite M320I07. A couple of minor unknown degradation products were characterized by their chromatographic properties as mainly polar derivatives.

In general the aqueous extracts contained only low amounts of radioactive residues (< 0.067 mg/kg or < 0.5 % TRR) which were separated into several unknown mainly polar peaks. The metabolic pathway for the degradation of metaflumizone is shown in Figure 3.

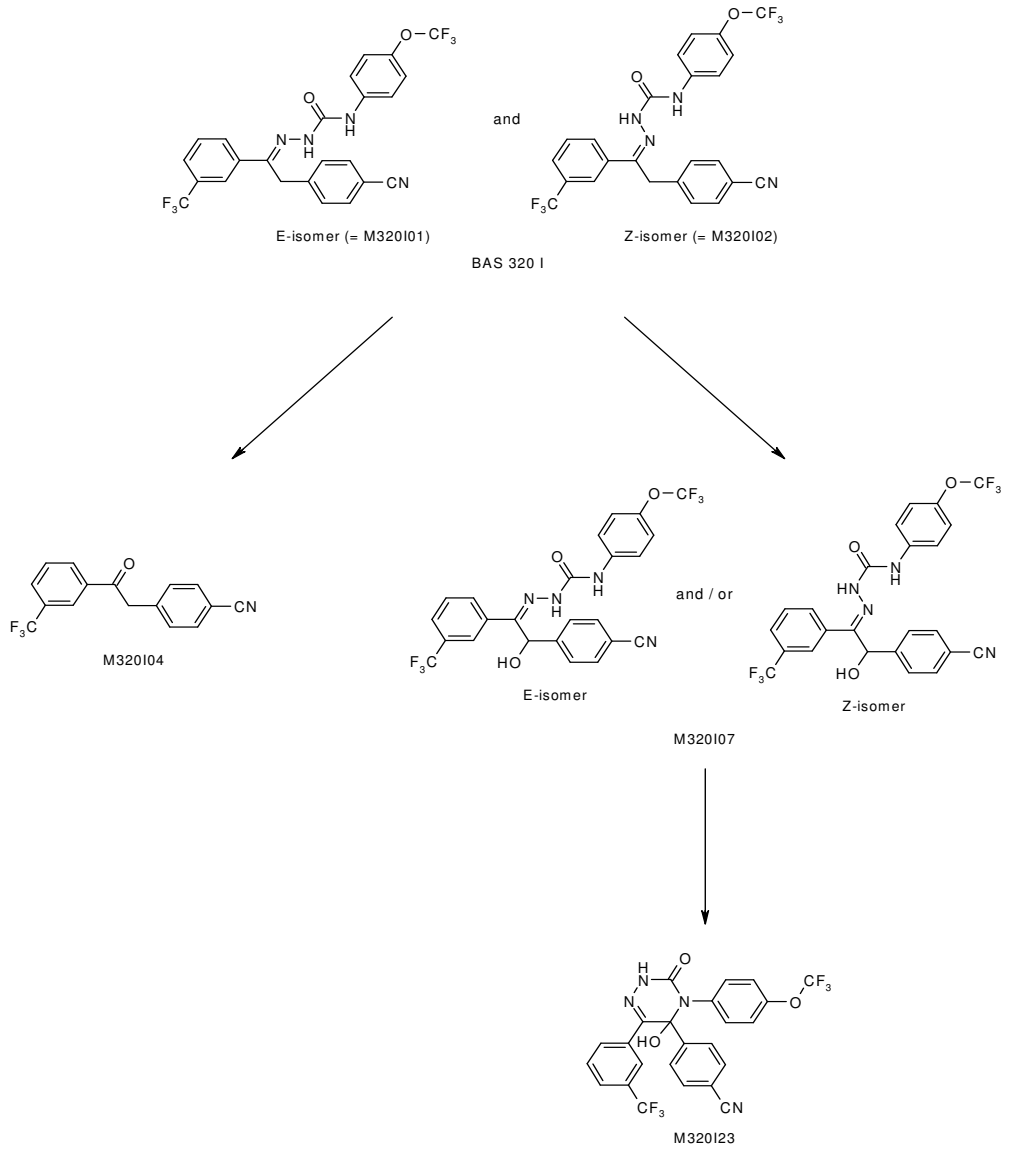


Figure 3 Metabolic pathway of [^{14}C]metaflumizone in white cabbage (Rabe and Glaessgen 2004, 2004/1000747).

Table 14 Summary of major components in white cabbage leaf after post emergence treatment with [^{14}C]metaflumizone (Rabe and Glaessgen 2004, 2004/1000747)

Metabolite	White cabbage matrix			
	Leaf (7 DAT)		Leaf (3 DAT)	
	mg/kg	% TRR	mg/kg	% TRR
B-label				
M320I04	2.1	15.1	1.6	16.0
M320I07 (E- and/or -Z isomer)	0.44	3.2	0.21	2.2
M320I23	0.047	0.3	0.064	0.7
parent E-isomer	8.3	60.4	6.2	64.2
parent Z-isomer	2.4	17.2	1.1	11.3
T-label				
M320I07 (E- and/ or Z-isomer)	0.305	2.1	0.342	2.4
M320I23	0.030	0.2	nd	nd
parent E-isomer	11.9	80.7	10.1	71.4
parent Z-isomer	2.6	17.5	0.84	6.0

DAT: days after last treatment

TRR: sum of ERR + PES

Tomatoes

Tomato plants grown indoors and outdoors in the USA were treated with [benzonitril-U-^{14}C]- and [trifluoromethoxyphenyl-U-^{14}C]-metaflumizone, refered to as B-label and T-label, respectively (Mallipulli 2002a, 2002/5004090; Afzal 2004a, 2004/5000055). Plants were treated six times at weekly intervals. The radiolabeled metaflumizone spray mixture was prepared as a suspension concentrate dispersed in water. A total of 2.016 kg ai/ha was applied (4.2 × of the anticipated seasonal application rate). Two hours, or 0.1 days, after the last spraying of test substance, half of the mature tomatoes were harvested and frozen for analysis. Seven days later all remaining ripe and near-ripe tomatoes were harvested and frozen for analysis.

Before analysis, tomato samples were homogenized by grinding them with dry ice. Total radioactive residues (TRR) were determined by oxidative combustion. Tomato samples were extracted with acetonitrile three times. The post extraction solid (PES) was combusted and then radioactivity was measured through LSC. The acetonitrile-extractable residue was analysed using HPLC. The identity of the extractable radioactive residue component was determined by HPLC and confirmed, when possible, by mass spectrometric analysis of the isolates.

TRR in tomato fruit collected from outdoor plots and shade cloth greenhouse plots at 0.1 days PHI was 0.6 mg/kg to 0.78 mg/kg for the B-label and 0.39 mg/kg to 0.40 mg/kg for the T-label. Tomato fruit collected at seven days PHI had a TRR of 0.34 mg/kg to 0.52 mg/kg and 0.295 mg/kg to 0.30 mg/kg for the B- and T-label. Results show that approximately 25 to 33% of the fruit total radioactive residues were lost by day seven when compared to 0.1 day PHI samples TRR. Tomato residue data suggests that there are no significant differences found in tomato TRR between the two ^{14}C-labels and outdoor field and shade cloth greenhouse conditions (see Table 15). Tomatoes grown in glasshouses were shown to contain slightly higher levels of benzonitrile labelled metaflumizone compared to trifluromethoxyphenyl labelled compound. A decline in TRR was seen between applications at day 1 and 7 day PHI.

Table 15 Incurred total radioactive residues in tomatoes (Mallipudi 2002a, 2002/5004090; Afzal 2004a, 2004/5000055).

		TRR in mg/kg	
Sample type	DAT	B-label	T-label
Fruit - outdoor	0. 1	0.6	0.40
fruit - outdoor	7	0.34	0.30

		TRR in mg/kg	
Sample type	DAT	B-label	T-label
Fruit - shade cloth greenhouse	0. 1	0.78	0.39
Fruit - shade cloth greenhouse	7	0.52	0.3

DAT: days after last treatment

TRR: total radioactive residues

The extractability of ^{14}C-residues in tomatoes is summarized in Table 16. Based on the TRR in the tomato samples, the extractable residue in acetonitrile ranged from 94% to 98% of radioactive residue (0.29 mg/kg to 0.77 mg/kg) for both B- and T-label. The radioactivity in tomato was readily extractable with acetonitrile. The unextractable radioactivity in the remaining post extraction solid (PES) contained 2.03% to 6.2% of residue (0.01 mg/kg to 0.04 mg/kg). PES fraction was not further characterized. In total, at least 94% of the TRR in the tomato samples was extracted regardless of the ^{14}C-labels and tomato sampling dates. There were no apparent differences in the extractability of radioactivity for B- and T-label in tomato samples.

Table 16 Percent distribution of radioactivity in fractions extracted from tomatoes (Mallipudi 2002a, 2002/5004090; Afzal 2004a, 2004/5000055).

Experiment conditions	Sample date	Distribution of radioactivity				
		Fraction	B-label		T-label	
			%	mg/kg	%	mg/kg
Field	0.1 DAT	TRR	100.00	0.6	100.00	0.40
		Acetonitrile	93.81	0.56	96.09	0.38
		Post extraction solid	6.19	0.04	3.91	0.02
	7 DAT	TRR	100.00	0.34	100.00	0.30
		Acetonitrile	93.89	0.32	94.62	0.29
		Post extraction solid	6.11	0.02	5.38	0.02
Shade cloth and greenhouse	0.1 DAT	TRR	100.00	0.78	100.00	0.39
		Acetonitrile	97.82	0.77	97.97	0.38
		Post extraction solid	2.18	0.02	2.03	0.01
	7 DAT	TRR	100.00	0.52	100.00	0.3
		Acetonitrile	96.23	0.5	97.53	0.29
		Post extraction solid	3.77	0.02	2.47	0.01

DAT: days after last treatment

The extractable ^{14}C-residues from B- and T-label treated tomato were used to define the metabolic profile of metaflumizone. The predominant metabolite concentrations found in tomato samples at 0.1 and 7 day PHI are shown in Table 17. The parent compound metaflumizone was identified as the most prominent radiocomponent of the acetonitrile extractable ^{14}C-residues with 59 to 84% of the total radioactive residue. Metabolite M320I23 accounted for 0.007 mg/kg to 0.016 mg/kg (1.38% to 3.57% of TRR). Metabolites M320I04 and M320I06 were present only in the B-label samples and accounted for 0.04 mg/kg to 0.12 mg/kg (11.9% to 15.7% of TRR) and 0.003 mg/kg to 0.005 mg/kg (0.49% to 0.83% of TRR), respectively. In general, the concentration of E- and Z-isomers in tomato decreased from 0.1 day PHI to seven days PHI. Many minor radioactive unknowns (approximately 9-16) were detected and found to account for 0.021 mg/kg to 0.077 mg/kg, however, each individual unknown metabolite was present at or less than 0.01 mg/kg. The metabolic pathway for the degradation of metaflumizone in tomatoes is shown in Figure 4.

Table 17 Summary of [^{14}C]metaflumizone derived residue components in extractable residue fractions from tomatoes (Mallipudi 2002a, 2002/5004090; Afzal 2004a, 2004/5000055)

Experiment conditions	Sample date	Distribution of radioactivity				
			B-label		T-label	
		Residue component	% TRR	mg/kg	% TRR	mg/kg
Field	0.1 days after last spray		100.00	0.60	100.00	0.40
		Parent	62.43	0.37	79.08	0.32
		M320I01 (E)	28.71	0.17	35.45	0.14
		M320I02 (Z)	33.72	0.20	43.63	0.18
		M320I23	2.65	0.016	3.49	0.014
		M320I04	12.63	0.076	np	np
		M320I06	0.70	0.004	np	np
		[a] Other unknowns (x)	12.84 (15)	0.077	11.43 (13)	0.046
		Post extraction solid	6.19	0.037	3.91	0.02
	7 days after last spray		100.00	0.34	100.00	0.30
		Parent	59.14	0.20	80.77	0.24
		M320I01 (E)	24.57	0.083	31.75	0.096
		M320I02 (Z)	34.57	0.12	49.02	0.15
		M320I23	3.48	0.012	3.57	0.011
		M320I04	11.91	0.040	np	np
		M320I06	0.83	0.003	np	np
		[a] Other unknowns (x)	15.14 (16)	0.051	7.11 (9)	0.021
		Post extraction solid	6.11	0.021	5.38	0.016
Shade cloth and greenhouse	0.1 days after last spray		100.00	0.78	100.00	0.39
		Parent	72.28	0.57	83.70	0.33
		M320I01 (E)	44.01	0.35	46.66	0.18
		M320I02 (Z)	28.27	0.22	37.04	0.14
		M320I23	1.38	0.01	2.62	0.01
		M320I04	15.73	0.12	np	np
		M320I06	0.61	0.005	np	np
		[a] Other unknowns (x)	6.85 (15)	0.054	9.90 (13)	0.038
		Post extraction solid	2.18	0.017	2.03	0.008
	7 days after last spray		100.00	0.52	100.00	0.295
		Parent	72.48	0.38	82.65	0.24
		M320I01 (E)	32.25	0.17	37.90	0.11
		M320I02 (Z)	40.25	0.21	44.75	0.13
		M320I23	1.91	0.010	2.27	0.007
		M320I04	11.54	0.060	np	np
		M320I06	0.49	0.003	np	np
		[a]Other unknowns (x)	8.13 (16)	0.042	10.59 (14)	0.031
		Post extraction solid	3.77	0.020	2.47	0.007

[a] Other unknowns (x): the number in parentheses represents the number of unknown metabolites.

np: not present

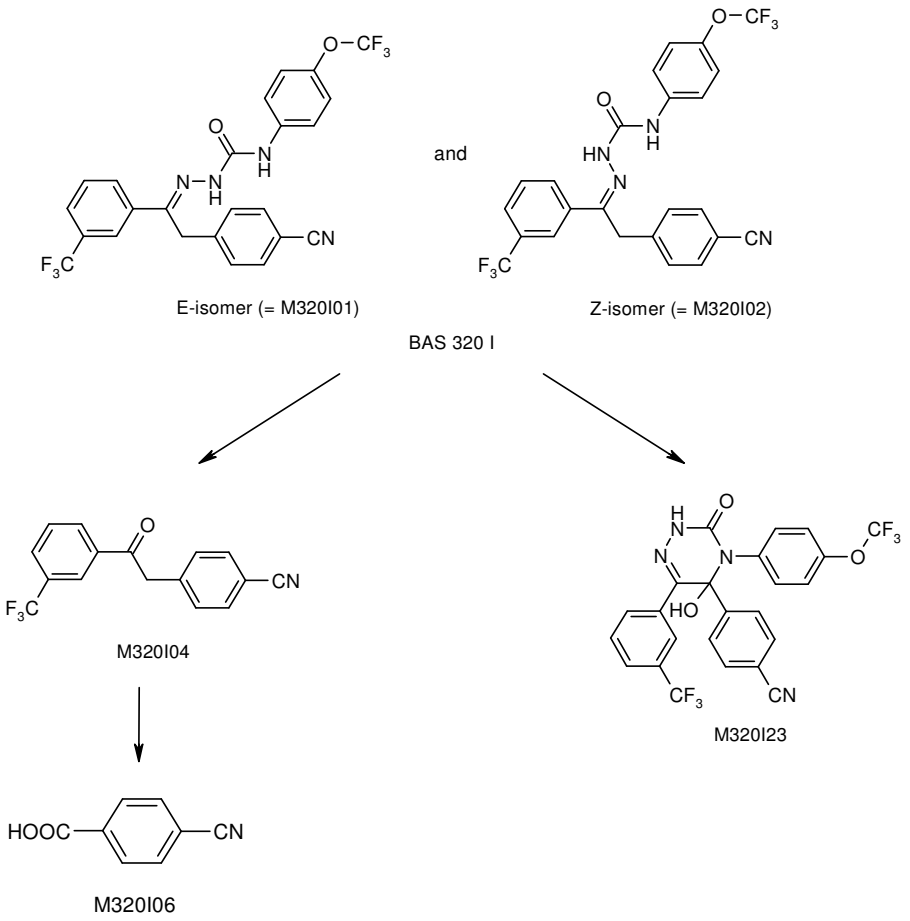


Figure 4 Proposed metabolic pathway for metaflumizone in tomatoes (Mallipudi 2002a, 2002/5004090; Afzal 2004a, 2004/5000055)

Cotton

An outdoor cotton metabolism study using ^{14}C-metaflumizone was conducted by Mallipulli (2002b, 2002/5003842) and Afzal (2004b, 2004/5000056). Outdoor cotton plots established with cotton crop were treated six times at weekly intervals with either the [benzonitrile ring-U-^{14}C] (B-label) or the [trifluoromethoxyphenyl ring-U-^{14}C] (T-label) with a total of 2.001 and 2.032 kg ai/ha total seasonal rate (4.2 × of the anticipated maximum label rate). Each radiolabeled metaflumizone spray mixture was prepared as a suspension concentrate dispersed in water. The test substances were applied as a broadcast spray. At 21 days after the last application of the test substance, all seed cotton and simulated gin trash samples of stems, leaves, and bracts were collected. Seed cotton was later ginned into lint and undelinted cottonseed. Table 18 shows total radioactive residues (TRR).

Table 18 Incurred total radioactive residues in cotton (Mallipudi 2002b, 2002/5003842; Afzal 2004b, 2004/5000056)

Sample type	DAT	TRR mg/kg	
		B-label	T-label
Undelinted cotton seed	21	0.37	0.14
Gin trash	21	29.3	19.2

DAT: days after last treatment

Table 19 shows the results of the extractability of TRR from undelinted cotton seed and gin trash. In the seed samples, the extractable residue in methanol ranged from 75.1% to 78.1% (0.11 mg/kg to 0.28 mg/kg) of the total radioactive residue for both B-label and T-label. Undelinted cottonseed samples after methanol extraction were subjected to extraction using methanol : water : hydrochloric acid (90 : 10 : 0.25) which removed 6.7% to 9.4% of seed residue (0.009 mg/kg to 0.035 mg/kg). The unextractable radioactivity in the remaining post extraction solid (PES) contained 15.2% to 15.53% of residue (0.021 mg/kg to 0.058 mg/kg). PES fraction was not further characterized. In total, at least 84% of the TRR in the undelinted cottonseed samples were extracted for both ^{14}C-labels.

In the gin trash samples, the extractable residue in methanol/acetonitrile ranged from 87.8% to 91.1% (17.5 mg/kg to 25.7 mg/kg) of the total radioactive residue for both B-label and T-label. Further extraction with methanol : water : hydrochloric acid removed 5.9% to 9.4% of gin trash residue (1.1 mg/kg to 2.8 mg/kg). The unextractable radioactivity in the remaining post extraction solid (PES) contained 2.7% to 3.0% of residue (0.58 mg/kg to 0.80 mg/kg). In total, at least 96% of the TRR in the gin trash samples was extracted for both ^{14}C-labels. There were no apparent differences in the extractability of radioactivity for B-label and T-label cotton samples.

Table 19 Extraction of residual radioactivity in fractions extracted from cottonseed matrices (Mallipudi 2002b, 2002/5003842; Afzal 2004b, 2004/5000056)

		Distribution of radioactivity			
		B-label		T-label	
Sample	Fraction	%	mg/kg	%	mg/kg
Undelinted cotton seed	TRR	100.00	0.37	100.00	0.14
	Methanol	75.09	0.28	78.10	0.11
	Methanol : water : HCl (90 : 10 : 0.25)	9.39	0.035	6.73	0.009
	Post extraction solid	15.53	0.058	15.17	0.021
	Total	100.00	0.37	100.00	0.14
Gin trash	TRR	100.00	29.3	100.00	19.2
	Methanol/ acetonitrile	87.82	25.7	91.09	17.5
	Methanol : water : HCl (90 : 10 : 0.25)	9.43	2.8	5.90	1.1
	Post extraction solid	2.74	0.80	3.01	0.58
	Total	99.99	29.3	100.00	19.2

The methanol and methanol/water/HCl extractable ^{14}C-residues of undelinted cottonseed were used to define the metabolic profile of metaflumizone. The predominant metabolite concentrations found in cotton samples at 21 day PHI are shown in Table 20. The parent compound metaflumizone was identified as the most prominent radiocomponent of the methanol-extractable ^{14}C-residues from undelinted cottonseed with 0.13 mg/kg (33.7% of TRR) in the B-label and 0.065 mg/kg (46.4% of TRR) in the T-label. Metabolite M320I23 present in both ^{14}C-labels accounted for 0.011 mg/kg to 0.026 mg/kg (7.05% to 8.4% of TRR). Metabolites M320I04 and M320I06 were present only in B-label and accounted for 0.059 mg/kg (16.6% of TRR) and 0.024 mg/kg (6.4% of TRR), respectively. Metabolite M320I05 was present only in T-label and accounted for a small amount (0.002 mg/kg; 1.47% of TRR). Many minor radioactive unknowns (approximately 16-19) were detected and found to account for 0.039 mg/kg to 0.074 mg/kg (20.0% to 28.0% of TRR).

The acetonitrile/methanol extractable ^{14}C-residues from gin trash were used to define the metabolic profile of metaflumizone. The predominant metabolite concentrations found in cotton samples at 21 day PHI are shown in Table 20. The parent compound metaflumizone was identified as the most prominent radiocomponent of the acetonitrile/methanol extractable ^{14}C-residues from gin trash with 14.1 mg/kg (48.1% of TRR) in the B-label and 12.5 mg/kg (64.7% of TRR) in the T-label.

Metabolite M320I23 accounted for 1.6 mg/kg to 1.89 mg/kg (6.4% to 8.3% of TRR). Metabolites M320I04 and M320I06 were present only in B-label samples and accounted for 3.8 mg/kg (13.1% of TRR) and 2.1 mg/kg (7.2% of TRR), respectively. Many minor radioactive unknowns (approximately 15–19) were detected and found to account for 3.1 mg/kg to 3.8 mg/kg (12.8% to 16.4% of TRR) in total. Based on the identified metabolites, the metabolic fate of metaflumizone in cotton is proposed as shown in Figure 5.

Table 20 Summary of [^{14}C]metaflumizone derived residue components in extractable residue fractions from cotton (Mallipudi 2002b, 2002/5003842; Afzal 2004b, 2004/5000056).

		Distribution of radioactivity			
		B-label		T-label	
Cotton sample	Radiocomponent	% of TRR	mg/kg	% of TRR	mg/kg
Undelinted cotton seed	TRR	100.00	0.37	100.00	0.14
	BAS 320 I (E+Z)	33.72	0.13	46.38	0.065
	M320I01 (E)	16.80	0.063	20.80	0.029
	M320I02 (Z)	16.92	0.063	25.58	0.036
	M320I23	7.05	0.026	8.37	0.011
	M320I04	16.64	0.059	np	np
	M320I05	np	np	1.47	0.002
	M320I06	6.41	0.024	np	np
	Other unknowns	20.03	0.074	28.01	0.039
	Post extraction solid	15.53	0.058	15.17	0.021
Gin trash	TRR	100.00	29.3	100.00	19.2
	BAS 320 I (E+Z)	48.09	14.1	64.73	12.5
	M320I01 (E)	19.06	5.6	25.82	5.0
	M320I02 (Z)	29.03	8.5	38.91	7.5
	M320I23	6.44	1.9	8.34	1.6
	M320I04	13.08	3.8	np	np
	M320I06	7.20	2.1	np	np
	Other unknowns	12.83	3.8	16.35	3.1
	MeOH:H_2O:HCl Extract	9.43	2.8	5.90	1.1
	Post extraction solid	2.74	0.80	3.01	0.58

np: not present

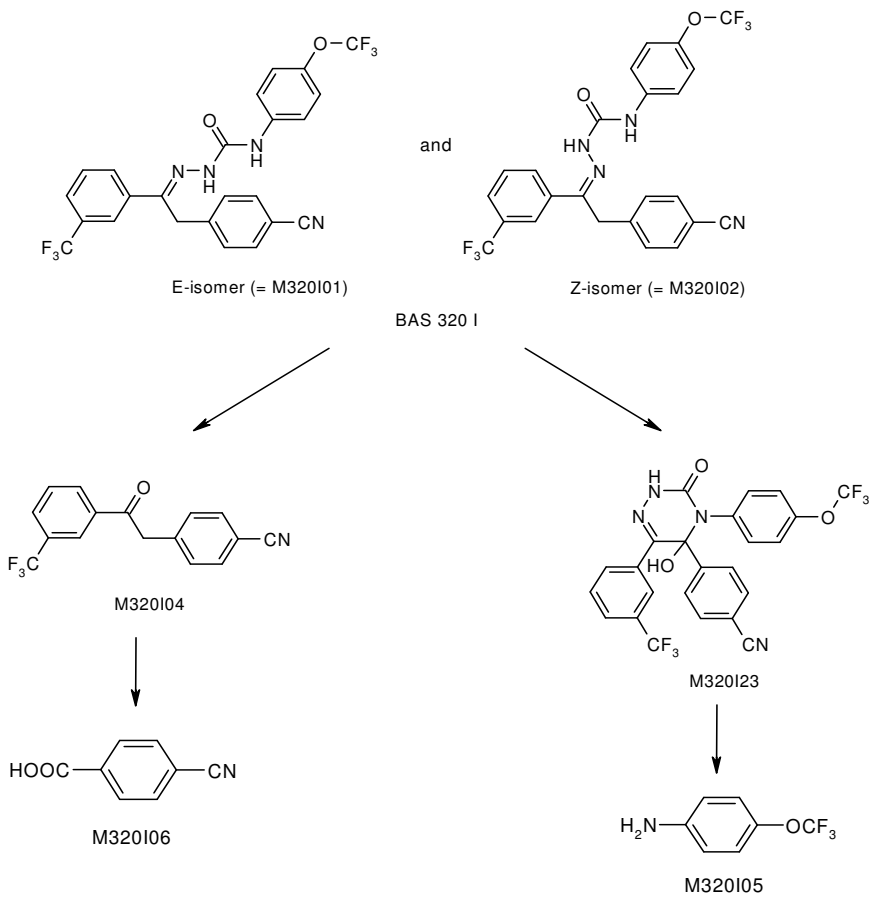


Figure 5 Proposed metabolic pathway for metaflumizone in cotton (Mallipudi 2002b, 2002/5003842; Afzal 2004b, 2004/5000056)

Environmental fate in soil

The meeting received information on aerobic and anerobic degradation in soil, photolysis on the soil surface, field dissipation, adsorption/desorption in soil, leaching into groundwater and confined and field rotational crop studies. Because metaflumizone is intended for use as soil application (bait) and as foliar treatment close to harvest, only aerobic degradation and the rotational crop studies were considered relevant for the present evaluations. The other information was not summarized.

The fate and behaviour of metaflumizone in the environment was investigated using the trifluoromethoxyphenyl-U-^{14}C-, benzonitrile-U-^{14}C- and trifluoromethylphenyl-U-^{14}C-labelled compound.

Aerobic degradation

Study 1

The aerobic soil metabolism of metaflumizone was studied by Ta (2004c, 2004/5000067) in a Sassafras sandy loam (New Jersey, USA) for 364 days in a flow through system at 20 °C under dark

conditions. Two radiolabels, benzonitrile- and trifluoromethoxyphenyl-U-^{14}C, were used for treatment. The soil was adjusted to 75% of 1/3 bar field moisture capacity and treated at a rate of 0.8 mg/kg equivalent to 0.88 kg ai/ha. Depending on the label, about 29 and 8% of the applied radioactivity was mineralized to CO_2 after 364 days. The non-extracted residues reached 21 and 38% at the end of the study for the benzonitrile and trifluoromethoxyphenyl-label, respectively (see Table 21).

Table 21 Recovery and distribution of radioactivity during soil metabolism of [^{14}C]metaflumizone mean of two replicates in % of total applied radioactivity (Ta 2004c, 2004/5000067).

DAT	MeOH extract	MeOH/ water extract [a]	MeOH/ HCl extract [b]	NaOH trap (CO_2)	glycole trap	NER	balance
Benzonitrile-label (B-label)							
0	107.5	na	na	na	na	0.8	108.3
14	90.7	na	na	1.2	0.0	3.1	95.1
28	102.5	na	1.9	2.7	0.0	1.6	108.7
61	92.9	na	na	5.7	0.0	3.2	101.9
100	89.1	na	na	9.7	0.0	4.6	103.3
120	82.9	na	na	11.7	0.0	7.3	101.9
187	66.9	na	na	17.7	0.0	16.7	101.3
273	52.4	na	6.5	25.6	0.0	17.2	101.7
364	43.0	na	7.5	28.6	0.0	20.8	99.9
Trifluoromethoxyphenyl-label (T-label)							
0	104.1	na	na	na	na	1.1	105.2
14	90.7	na	na	0.2	0.0	3.5	94.5
28	101.8	na	4.6	0.5	0.0	2.8	109.7
61	87.3	1.6	8.2	1.4	0.0	5.5	99.1
100	81.3	1.9	9.5	2.7	0.0	7.2	96.9
120	76.0	1.8	10.3	3.3	0.0	9.5	94.9
187	65.3	1.7	11.7	5.2	0.0	17.2	94.4
273	51.0	na	9.7	7.1	0.0	30.1	97.9
364	35.7	na	15.6	8.2	0.0	38.1	97.5

[a] Not further analysed due to low radioactivity

[b] Not further analysed because of obvious destruction of soil structure

na: Not analysed

DAT: Days after last treatment

NER: Non extractable residues

Several metabolites were formed in soil of which four could be identified as oxidation and cleavage products (M320I07, M320I23, M320I04, M320I08). Only metabolite M320I23 (oxidated cyclization product) reached amounts > 5% of the total applied radioactivity (TAR) with a maximum of 8.1% after 187 days of incubation. The results are shown in Table 22.

Table 22 Radio-HPLC results of MeOH-extracts after application of [^{14}C]metaflumizone to aerobic soil, mean of two replicates in % of total applied radioactivity (Ta 2004c, 2004/5000067).

DAT	MeOH extract total	BAS 320 I (E)	BAS 320 I (Z)	Parent sum of both isomers	M320I23	M320I07	M320I04	M320I08	unknown 47 min	Others [a]
Benzonitrile-label (B-label)										
0	107.5	92.5	10.8	103.3	1.0	0.5	0.8	*	0.2	1.7
14	90.7	75.8	10.6	86.4	1.1	1.1	0.5	*	0.4	1.2
28	102.5	86.1	9.3	95.4	1.7	1.8	0.8	*	0.6	2.2
61	92.9	74.8	10.6	85.4	2.5	2.0	1.4	*	0.3	1.3
100	89.1	66.1	13.6	79.7	2.3	1.8	0.6	*	2.2	2.5

DAT	MeOH extract total	BAS 320 I (E)	BAS 320 I (Z)	Parent sum of both isomers	M320I23	M320I07	M320I04	M320I08	unknown 47 min	Others [a]
120	82.9	58.4	13.7	72.1	4.3	2.7	1.1	*	0.4	2.3
187	66.9	39.4	13.7	53.1	8.1	2.3	0.6	*	0.2	2.6
273	52.4	28.5	13.0	41.5	6.0	2.1	0.4	*	0.3	2.1
364	43.0	18.9	11.1	30.0	7.5	2.3	0.5	*	0.3	2.4
Trifluoromethoxyphenyl-label (T-label)										
0	104.1	89.0	11.3	100.3	0.5	0.6	*	0.1	0.4	2.2
14	90.7	76.9	9.7	86.6	0.7	1.0	*	0.1	0.4	1.9
28	101.8	87.2	8.4	95.6	1.4	1.8	*	0.1	0.5	2.4
61	87.3	67.8	11.6	79.4	2.3	2.1	*	0.1	0.4	3.0
100	81.3	60.1	12.4	72.5	3.3	2.3	*	0.0	0.6	2.6
120	76.0	52.8	13.3	66.1	3.8	2.4	*	0.1	0.6	3.0
187	65.3	44.6	9.9	54.5	4.9	2.0	*	0.1	0.6	3.2
273	51.0	29.2	11.4	40.6	5.9	1.8	*	0.0	0.7	2.0
364	35.7	17.2	6.0	23.2	7.2	2.1	*	0.1	0.4	2.7

*Cannot be detected with the label used

[a] Calculated as difference between "MeOH extract total" and all other listed peaks

The DT_{50} and DT_{90} values of metaflumizone were calculated based on first-order kinetics. The degradation rate constant of the parent compound versus time was determined by linear regression analysis. The DT_{50} and DT_{90} values were calculated using the following equations:

DT_{50} = ln2/rate constant; DT_{90} = ln10/rate constant.

The first order half-lives of Metaflumizone in aerobic soil were 186 and 209 days, the respective DT_{90} values were 617 and 694 days for the benzonitrile- and trifluoromethoxyphenyl-label, respectively. The corresponding coefficients of determination were $r^2 = 0.981$ and $r^2 = 0.975$.

Study 2

The aerobic soil metabolism of metaflumizone was studied by Janz and Bayer (2005, 2004/1022504) in three different German soils for 122 days in a flow through system at 20 °C under dark conditions. For the laboratory degradation study in various soils, the [^{14}C]trifluoromethylphenyl- labelled compound was used to get information on the fate of the third ring system of the metaflumizone molecule. The soils were adjusted to 40% of the maximum water holding capacity and were treated at a rate of 0.64 mg/kg equivalent to 0.24 kg ai/ha. Samples were taken at 0, 3, 7, 14, 28, 63, 91, and 122 days after treatment.

The material balance for all soils and sampling times ranged between 92.2 and 107.1% TAR. The extractability of radioactivity decreased slowly in all three soils reaching 7093% TAR after 122 days. For all samples, the majority of radioactivity could be extracted with acetonitrile. The subsequent extraction yielded additional 0.8 to 5.5% TAR. The acetone fractions contained only negligible amounts of radioactivity (• 0.8% TAR). Non-extracted residues were formed in all three soils in low to moderate amounts reaching their maximum of 6.1 to 12.5% TAR at the end of the study (see Table 23).

Table 23 Recovery and distribution of radioactivity during soil metabolism of [^{14}C]metaflumizone (trifluoromethylphenyl-label) in % of total applied radioactivity (Janz and Bayer 2005, 2004/1022504).

DAT	extractable residues				NER	volatiles			material balance
	acetonitrile	acetonitrile/ water	acetone	total		NaOH trap (CO_2)	H_2SO_4 trap	ethylene glycol trap	
Soil "Bruch West"									
0*	98.2	1.2	0.1	99.6	0.4	nd	nd	nd	100.0
3	97.8	2.0	0.3	100.2	1.3	0.1	0.0	0.0	101.6
7	92.3	3.1	0.3	95.8	1.7	0.1	0.0	0.0	97.6
14	93.8	2.9	0.5	97.2	2.2	0.2	0.0	0.0	99.7
28*	95.2	3.3	0.5	99.1	3.1	0.4	0.0	0.0	102.6
63	88.3	4.3	0.6	93.2	3.8	0.9	0.0	0.0	97.9
91	85.4	4.8	0.7	91.0	5.5	1.6	0.0	0.0	98.1
122	82.7	5.5	0.8	89.0	6.1	2.0	0.0	0.0	97.1
Soil "Lufa 3A"									
0*	97.1	1.3	0.2	99.6	0.4	nd	nd	nd	100.0
3	100.2	2.3	0.4	103.0	1.6	0.2	0.0	0.0	104.8
7	99.7	2.8	0.4	102.9	2.3	0.5	0.0	0.0	105.7
14	99.9	3.0	0.5	103.4	2.3	0.7	0.0	0.0	106.4
28*	98.6	3.2	0.4	102.2	3.7	1.3	0.0	0.0	107.1
63	91.9	4.5	0.6	97.1	5.7	2.4	0.0	0.0	105.1
91	77.4	4.8	0.5	82.7	6.3	3.2	0.0	0.0	92.2
122	88.0	4.4	0.7	93.0	7.4	4.0	0.0	0.0	104.4
Soil "Lufa 2.2"									
0*	98.4	0.9	0.3	99.6	0.4				100.0
3	98.0	1.7	0.3	100.1	1.5	0.3	0.0	0.0	101.8
7	97.3	2.2	0.4	99.8	1.9	1.0	0.0	0.0	102.7
14	93.9	2.6	0.5	96.9	3.5	2.4	0.0	0.0	102.9
28*	87.4	2.4	0.5	90.4	5.2	5.1	0.0	0.0	100.7
63	77.2	3.3	0.7	81.2	9.0	8.6	0.0	0.0	98.8
91	77.4	4.2	0.5	82.2	10.7	11.1	0.0	0.0	103.9
122	64.3	5.4	0.8	70.4	12.5	14.7	0.0	0.0	97.6

NER: non-extracted residues

The results of the HPLC analysis are shown in Table 24. Metaflumizone decreased slowly to 61–81% TAR after 122 days. In all three soils, numerous minor metabolites appeared during the course of the study, among them known metabolites like M320I23, M320I09, M320I04 and M320I29. All metabolites were formed only in very small amounts and none of them exceeded 3.8% TAR at any sampling. Formation of CO_2 was observed in all three soils reaching in total 2–15% TAR after 122 days. No other volatile compounds were detected. Non-extracted residues were formed in low to moderate amounts with a maximum of 613% TAR at the end of the study. It was shown that most of the radioactivity from the non-extracted residues was tightly bound to the soil matrix which could not be released with harsh extraction methods.

Table 24 Radio-HPLC results of soil extracts after application of [^{14}C]metaflumizone (trifluoromethylphenyl-label) in % of total applied radioactivity (Janz and Bayer 2005, 2004/1022504)

DAT	ACN + ACN/H_2O total	BAS 320 I (E)	BAS 320 I (Z)	BAS 320I sum	uk1 t_R ~3.9	M320I29 t_R ~29.4	M320I09 t_R ~39.9	M320I04 t_R ~42.8	M320I23 t_R ~43.7	uk2 t_R ~45.3	uk3 t_R ~46.4	others [a]
Soil "Bruch West"												
0*	99.4	78.1	17.2	95.3		0.8		2.6	0.5			0.3
3	99.9	80.2	15.1	95.2	0.3	0.5	0.1	2.0	0.7		0.1	1.0
7	95.5	81.2	9.8	91.0	0.6	0.7		0.5	0.5	0.1	0.5	1.4

DAT	ACN + ACN/H_2O total	BAS 320 I (E)	BAS 320 I (Z)	BAS 320I sum	uk1 t_R ~3.9	M320I29 t_R ~29.4	M320I09 t_R ~39.9	M320I04 t_R ~42.8	M320I23 t_R ~43.7	uk2 t_R ~45.3	uk3 t_R ~46.4	others [a]
14	96.7	82.4	10.0	92.4	0.4	0.2		0.7	0.7	0.2	0.9	1.3
28*	98.6	82.5	10.1	92.6	0.8	0.2	0.0	0.9	1.1	0.5	1.4	1.0
63	92.6	80.2	5.8	86.0	0.4	0.1	0.1	0.4	1.6	1.0	2.1	1.0
91	90.2	78.1	4.7	82.7	0.3	0.1	0.0	0.4	1.9	1.2	1.9	1.7
122	88.2	73.3	3.1	76.4	1.2	0.2	0.3	0.5	1.9	1.2	3.1	3.4
Soil “Lufa 3A”												
0*	99.4	76.3	18.4	94.7	0.0	1.2		2.5	0.4		0.1	0.4
3	102.6	83.5	14.8	98.3	0.8			1.8	0.6			1.1
7	102.5	85.8	12.8	98.6	0.3	0.3		0.9	0.6	0.3	0.5	1.0
14	102.9	88.9	9.6	98.5	0.5	0.3		0.5	1.1	0.3	0.8	1.0
28*	101.8	84.4	10.8	95.2	0.6	0.1		1.0	1.1	0.4	1.6	1.6
63	96.4	81.2	6.1	87.4	0.4		0.1	1.3	2.2	1.0	1.9	2.3
91	82.2	69.6	4.3	73.9	0.6	0.1	0.1	0.8	1.9	1.0	1.8	2.1
122	92.4	77.1	3.6	80.7	2.8	0.2		0.5	2.6	1.9	1.6	2.2
Soil “Lufa 2.2”												
0*	99.3	79.5	15.1	94.5		0.8		2.8	0.3			0.9
3	99.7	83.6	11.5	95.1	0.1	0.5		1.5	0.8		0.3	1.4
7	99.4	84.4	9.7	94.1	1.0	0.9		1.0	0.8		0.3	1.4
14	96.4	85.3	7.2	92.4	1.2	0.7		0.4	0.6		0.4	0.7
28*	89.9	77.5	6.8	84.3	1.6	0.4		1.0	0.7	0.1	0.3	1.4
63	80.5	71.8	3.0	74.9	1.6	0.4		0.6	1.1	0.3	0.3	1.3
91	81.6	71.5	3.0	74.5	1.9	0.2	0.1	0.9	1.5	0.3	0.3	1.9
122	69.6	58.6	2.1	60.7	3.8	0.5		0.5	1.5	0.2	0.2	2.2

* Mean value of two replicates

[a] Each single compound < 0.9% TAR

No value: means not detected

t_R: retention time [min]

uk: unknown

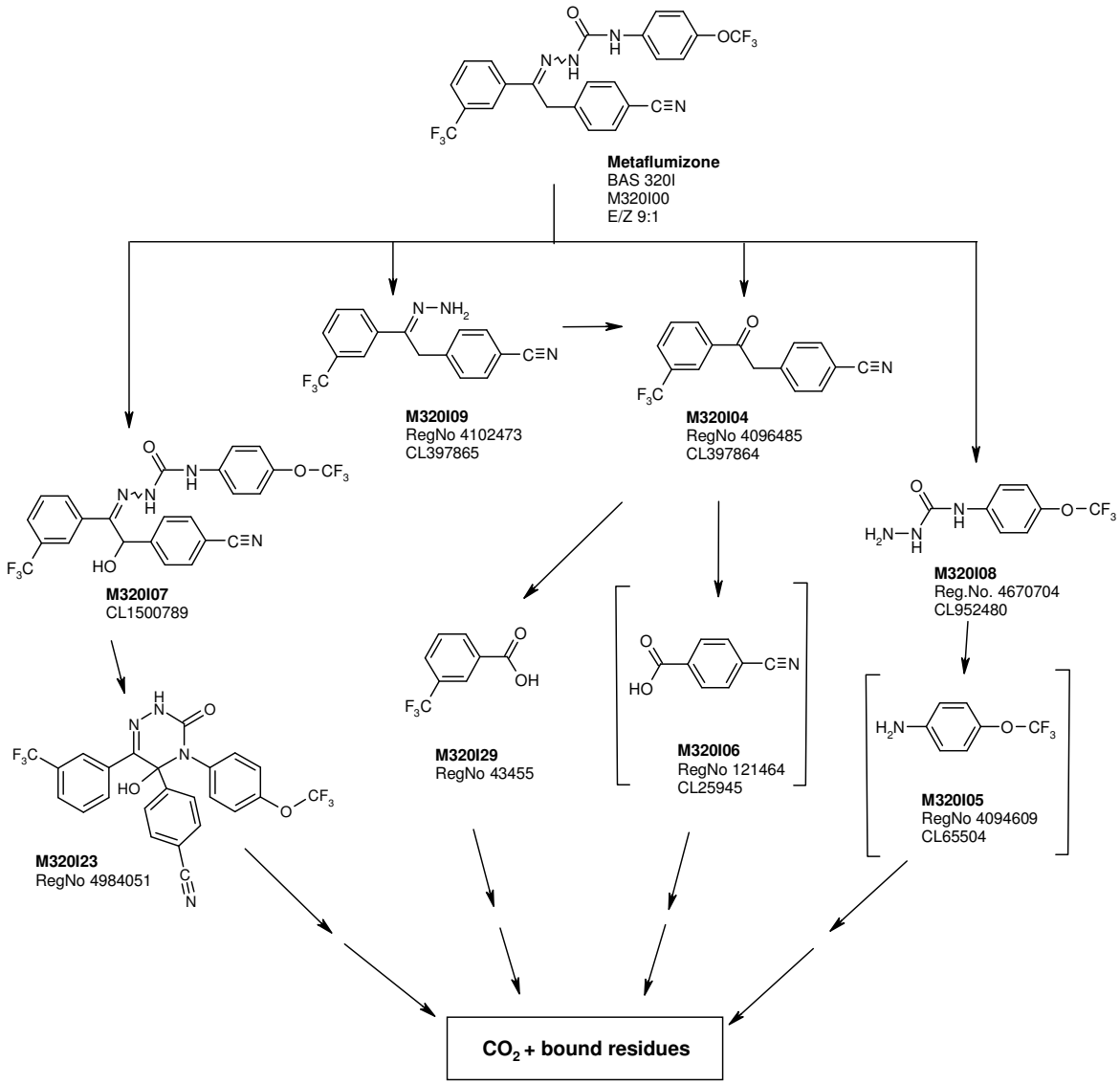
From the results of this study it is concluded that metaflumizone is oxidized to the cyclic metabolite M320I23. Additionally, metaflumizone undergoes degradation via hydrolysis to form M320I09 and M320I04, the latter being oxidized to the benzoic acid M320I29. Ultimately, the degradation products are mineralized to CO_2 or incorporated into the humic substances. The proposed route of degradation is shown in Figure 6.

The bound residues of the 91 day soil samples were further characterized by NaOH extraction (Table 25). The majority of radioactivity was always associated with the non-soluble humin fraction. Only low amounts of radioactivity were found in the fulvic and humic acids. Since only negligible amounts of radioactivity could be found in the organic phase after partitioning the fulvic acids with ethyl acetate (< 1% TAR), no further HPLC analysis was performed. From this it can be concluded that the non-extracted residues are tightly bound to the soil matrix and cannot be released even with harsh extraction methods.

Table 25 Characterization of the non-extracted residues of the 91 day soil samples after incubation with [^{14}C]metaflumizone (trifluoromethylphenyl-label) in % of total applied radioactivity (Janz and Bayer 2005, 2004/1022504)

Soil	NER total	NaOH-extract	fulvic acids			humic acids	humins (combustion)
			aqueous phase	ethyl acetate	total		
Bruch West	5.5	1.5	0.3	0.3	0.9	0.7	3.0
Lufa 3A	6.3	2.1	0.3	0.4	1.0	1.0	3.8
Lufa 2.2	10.7	6.3	1.4	0.8	2.4	3.0	3.4

The degradation rate of metaflumizone was calculated applying first order kinetics. The half-lives of metaflumizone were calculated to be 202, 328 and 423 days for the three soils, respectively.



[structures in brackets: theoretically possible intermediates, although not explicitely found in dark metabolism studies]

Figure 6 Proposed metabolic pathway for metaflumizone in soil, aerobic (Janz and Bayer 2005, 2004/1022504)

Residues in rotational crops

Confined accumulation study 1

The metabolism of metaflumizone was studied by Hoefs (2004a, 2004/1000741) in wheat, radish and lettuce as rotational crops. Two individual ^{14}C-labels of metaflumizone (trifluoromethoxyphenyl-

label, T-label and benzonitril-label, B-label) were applied directly to soil (loamy sand) at an application rate of 2 × 0.56 kg ai/ha of each label (approx. 2.3× of the maximum seasonal application rate). The plant back intervals were 30, 60, 120 and 365 days. The aging of the soil and the cultivation of the crops took place in plastic containers located either in growth chambers, where natural climatic conditions were simulated or in a vegetation hall or in a green house.

For all plant back intervals, the residue levels in lettuce leaves were very low and similar (see Table 26). No major differences between the two labels could be detected. The concentration of radioactive residues in radish leaves for 30, 60 and 120 days plant back intervals (PBI) were similar and slightly higher than in lettuce. At 365 days PBI, the residue concentration decreased to ≤ 0.015 mg/kg. At 120 days PBI, the residue levels in radish roots were lower than in the leaves, and both declined at 365 days PBI. For wheat forage, the residue levels at 30 days PBI were slightly higher than those for radish leaves. For both labels, the residue levels decreased over time. Wheat hay showed the highest initial residue levels and after longer plant back intervals, a significant decrease was detected. For wheat straw radioactive residues in samples from plant back intervals of 30 to 120 days PBI were in a range of 0.27–0.112 mg/kg with the highest residues from 60 days PBI and the lowest residues from 365 days PBI. Wheat chaff showed results similar to wheat straw, while wheat grain had a significant drop in concentration (from an initial concentration of ≤ 0.174 mg/kg) at 365 days PBI. The results for wheat grain for 30, 60, and 120 days PBI were similar in both labels with a concentration of ≤ 0.174 mg/kg. A significant decrease could be detected at 365 days PBI.

The extractability of radioactive residues with methanol was dependent on the matrix under investigation. The extractability with methanol in the matrices lettuce and radish was good and more or less in the same range (see Table 26). Wheat matrices in general showed lower extractabilities with methanol and the lowest extractability was observed in grain.

Table 26 Summary of components in rotational crops after [^{14}C]metaflumizone treatment (Hoefs 2004a, 2004/1000741)

Crop parts	T-label			B-label		
	TRR mg/kg	MeOH/H_2O mg/kg (% TRR)	NER mg/kg (% TRR)	TRR mg/kg	MeOH/H_2O mg/kg (% TRR)	NER mg/kg (% TRR)
Plant back interval 30 days						
Lettuce leaf	0.002	0.001 (65.0)	0.001 (35.1)	0.008	0.006 (69.0)	0.002 (31.0)
Radish leaf	0.036	0.022 (60.5)	0.014 (39.5)	0.022	0.013 (59.9)	0.009 (40.1)
Radish root	0.013	0.007 (62.9)	0.005 (37.1)	0.019	0.013 (65.7)	0.006 (34.3)
Wheat forage	0.052	0.027 (52.0)	0.025 (48.0)	0.034	0.020 (57.1)	0.014 (42.9)
Wheat hay	0.669	0.278 (41.6)	0.391 (58.4)	0.310	0.170 (54.9)	0.140 (45.1)
Wheat straw	0.112	0.036 (32.4)	0.076 (67.7)	0.142	0.055 (38.9)	0.087 (61.1)
Wheat grain	0.089	0.015 (17.0)	0.074 (83.0)	0.122	0.014 (11.2)	0.109 (88.7)
Plant back interval 60 days						
Lettuce leaf	0.005	0.004 (76.1)	0.001 (23.9)	0.011	0.008 (70.3)	0.003 (29.6)
Radish leaf	0.026	0.015 (59.1)	0.011 (41.0)	0.021	0.012 (59.8)	0.008 (40.2)
Radish root	0.016	0.010 (64.5)	0.006 (35.5)	0.015	0.011 (73.1)	0.004 (27.0)
Wheat forage	0.026	0.012 (47.1)	0.014 52.9	0.031	0.014 (47.5)	0.016 (52.5)

Crop parts	T-label			B-label		
	TRR mg/kg	MeOH/H_2O mg/kg (% TRR)	NER mg/kg (% TRR)	TRR mg/kg	MeOH/H_2O mg/kg (% TRR)	NER mg/kg (% TRR)
Wheat hay	0.312	0.162 (51.8)	0.150 (48.2)	0.332	0.168 (50.6)	0.164 (49.4)
Wheat straw	0.270	0.107 (39.5)	0.163 (60.5)	0.239	0.101 (42.6)	0.137 (57.4)
Wheat grain	-	-	-	0.149	0.016 (10.6)	0.133 (89.4)
Plant back interval 120 days						
Lettuce leaf	0.010	0.006 (54.3)	0.004 (45.7)	0.007	0.005 (68.2)	0.002 (31.8)
Radish leaf	0.027	0.012 (47.4)	0.014 (52.6)	0.021	0.011 (54.5)	0.009 (45.5)
Radish root	0.020	0.012 (56.4)	0.009 (43.6)	0.012	0.009 (75.7)	0.003 (24.3)
Wheat forage	0.031	0.015 (47.6)	0.016 (52.4)	0.031	0.014 (46.1)	0.017 (53.9)
Wheat hay	0.173	0.069 (40.1)	0.103 (59.8)	0.230	0.091 (39.6)	0.139 (60.4)
Wheat straw	0.112	0.036 (32.3)	0.075 (67.6)	0.124	0.040 (32.2)	0.084 (67.7)
Wheat grain	0.174	0.016 (9.2)	0.158 (90.8)	0.164	0.016 (9.8)	0.148 (90.2)
Plant back interval 365 days						
Lettuce leaf	0.006	0.003 (56.3)	0.002 (43.7)	0.005	0.003 (55.2)	0.002 (44.8)
Radish leaf	0.015	0.010 (65.4)	0.005 (34.6)	0.011	0.007 (62.9)	0.004 (37.2)
Radish root	0.009	0.006 (70.6)	0.003 (29.4)	0.007	0.004 (67.0)	0.002 (33.0)
Wheat forage	0.023	0.012 (47.4)	0.012 (52.6)	0.022	0.013 (59.0)	0.009 (41.0)
Wheat hay	0.151	0.080 (52.8)	0.071 (47.2)	0.091	0.040 (44.5)	0.051 (55.5)
Wheat straw	0.050	0.020 (38.9)	0.030 (61.2)	0.040	0.014 (35.0)	0.026 (65.0)
Wheat grain	0.011	0.002 (20.0)	0.009 (80.0)	0.012	0.002 (14.7)	0.011 (85.3)

NER: non-extracted radioactivity residues

The total radioactive residues after 30 days of soil aging were comparable in both labels (see Table 27). During the next 5 months, until harvest of the ripe crops, the residues in the soil decreased. After longer plant back intervals of 60, 120 and 365 days, only a slight further decrease of the residues in soil was observed (lowest level detected in soil after harvest of lettuce, T-label, at a plant back interval of 365 days: 0.149 mg/kg).

Table 27 Total radioactive residues in soil samples after treatment with [^{14}C]metaflumizone (Hoefs 2004a, 2004/1000741).

Plant back interval days	TRR (mg/kg)	
	T-label	B-label
30	0.350	0.343
60	0.385	0.377
120	0.318	0.284
365	0.165	0.247

Confined accumulation study 2

A second confined rotational crop study was conducted by Hoefs (2004b, 2004/1000742) with two individual ^{14}C-labels of metaflumizone (trifluoromethoxyphenyl-label, T-label) and benzonitril-label, B-label) in lettuce, radish and wheat. The soil was treated with an application rate of 1.17 kg ai/ha of each label. One plant back interval of 30 days was carried out.

The residue levels in lettuce leaf were very low and had a range similar to radish roots, but were slightly higher in radish leaves (see Table 28). In wheat matrices, residues were generally higher than in other matrices with highest values in wheat hay. In wheat straw the residue level was higher in the B-label than in the T-label but the residue levels in wheat forage vary only slightly between the two labels. Lowest residues within the wheat matrices were observed for grain. The extractability of radioactive residues with methanol and water was dependent on the matrix under investigation (see Table 28). With the exception of grain, the extractability was good and ranged from 54–95% TRR. The major part was extractable with methanol. From the grain sample only 14.6% TRR were extractable in the best case.

Table 28 Extractability of the radioactivity in rotational crops after treatment with [^{14}C]metaflumizone and a plant back interval of 30 days (Hoefs 2004b, 2004/1000742)

Crop Parts	TRR	MeOH/H_2O		NER	
	mg/kg	mg/kg	% TRR	mg/kg	% TRR
T-label					
Lettuce	0.021	0.019	92.6	0.002	7.3
Radish leaf	0.044	0.037	85.4	0.006	14.6
Radish root	0.013	0.008	60.3	0.005	39.7
Wheat forage	0.095	0.090	94.7	0.005	5.3
Wheat hay	0.852	0.719	84.3	0.133	15.6
Wheat straw	0.183	0.098	53.9	0.084	46.0
Wheat grain	0.035	0.005	14.6	0.030	85.3
B-label					
Lettuce	0.017	0.013	73.2	0.005	26.8
Radish leaf	0.036	0.031	85.5	0.005	14.5
Radish root	0.007	0.004	61.0	0.003	39.0
Wheat forage	0.054	0.043	79.6	0.011	20.4
Wheat hay	0.812	0.702	86.5	0.109	13.5
Wheat straw	0.605	0.470	77.9	0.134	22.2
Wheat grain	0.095	0.010	11.5	0.084	88.5

DAT: days after last treatment

NER: non-extracted radioactivity residues

The total radioactive residues after 30 days of soil aging were slightly higher in the T-label with 0.58 mg/kg than in the B-label with 0.44 mg/kg. During the next months until harvest of the ripe crops the residues in the soil decreased a small amount to a level of about 0.38 mg/kg to 0.54 mg/kg. HPLC analysis of the methanol extracts showed that the unchanged parent compound was present in nearly all matrices (with the exception of wheat grain) as a minor component of the radioactive residue (see Table 29). In all matrices, except radish root and wheat grain, the metabolite patterns of the methanol extracts were quantitatively comparable. The radioactivity was divided into a range of peaks, mainly in the polar and medium polar fraction. In the B-label the label specific metabolites M320I04 and M320I06 could be identified. These metabolites were also minor components and only in wheat hay (both labels) and wheat straw (B-label) did peaks with a higher residue level appear in the medium polar fraction (see Table 29). The HPLC chromatograms of radish roots and wheat grain showed one major peak in the polar fraction, which accounted for 45–56% TRR in radish roots and 5–8% TRR in wheat grain.

Table 29 Summary of MeOH extractable degradation products in rotational crops after treatment with [^{14}C]metaflumizone (Hoefs, 2004b; 2004/1000742)

Crop parts	Polar region		Medium polar region [a]		Less polar region		M320I06		M320I04		Parent (E+Z Isomer)	
	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR
T-label												
Lettuce	0.001	3.2	0.017	79.5	0.001	3.9	--	--	--	--	0.000	1.6
Radish leaf	0.004	8.9	0.022	50.8	0.006	17.1	--	--	--	--	0.002	3.8
Radish root	0.008	56.7	--	--	--	--	--	--	--	--	0.000	0.9
Wheat forage	0.000	0.4	0.073	76.3	0.010	10.9	--	--	--	--	0.001	1.2
Wheat hay	0.009	1.0	0.520	61.0	0.041	4.8	--	--	--	--	0.015	1.8
Wheat straw	0.008	4.3	0.071	38.8	0.001	0.6	--	--	--	--	--	--
Wheat grain	0.003	7.7	0.000	1.2	--	--	--	--	--	--	--	--
B-label												
Lettuce	0.003	18.5	0.005	31.1	0.000	1.5	0.001	3.3	0.000	1.6	0.001	3.6
Radish leaf	0.001	3.1	0.019	51.4	0.001	2.5	--	--	0.001	2.3	0.001	3.9
Radish root	0.003	46.3	--	--	--	--	--	--	0.000	4.4	0.000	5.9
Wheat forage	0.001	2.8	0.029	54.4	0.004	7.4	0.002	3.9	0.002	3.6	0.002	4.5
Wheat hay	0.006	0.8	0.481	59.3	0.035	4.4	--	--	--	--	0.010	1.3
Wheat straw	0.005	0.9	0.292	48.3	0.018	2.9	0.010	1.7	--	--	0.014	2.4
Wheat grain	0.004	5.2	--	--	0.001	0.6	--	--	--	--	--	--

[a] Containing parent metaflumizone

TRR: total radioactive residues

The residual radioactive residues in the post extraction solid of lettuce, radish matrices, and forage were very low (see Table 28). Therefore no further investigations were done with these post extraction solids. Higher residual radioactive residues could be observed in the post extraction solids of wheat hay, straw, and grain. Different parts were released through the extraction with ammonia or NaOH and specific cleavage of conjugates with macerozyme, glucosidase/hesperidinase, amylase/amyloglucosidase and laccase/tyrosinase. A total of 64 and 95% of the residual residues after methanol and water extractions could be released with these treatments. Each treatment released only a small portion of the radioactivity. Extracts and supernatants after enzyme treatments with a sufficient amount of radioactivity were analysed by HPLC. The chromatograms showed several degradation products mainly in the polar and medium polar fraction and are comparable with the chromatograms obtained for the methanol extracts. These findings indicated that the enzyme treatments released polar and medium polar degradation products which had been associated with insoluble plant material including cell wall polymers and starch. The radioactive residues after extraction and enzymatic treatment were very low with maximum residue levels of 0.014 mg/kg.

The metabolic pathway of metaflumizone in succeeding crops is shown in Figure 7. Besides the parent, two other metabolites, M320I04 and M320I06, could be detected from the cleavage of metaflumizone.

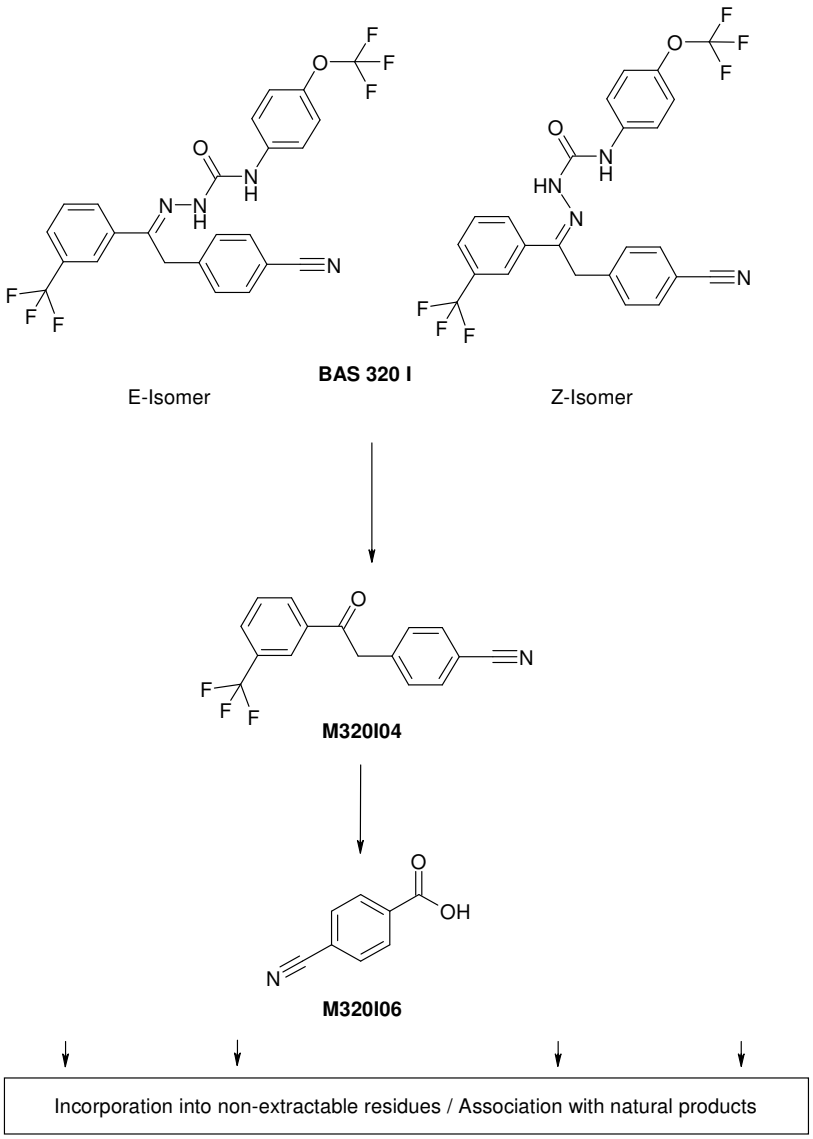


Figure 7 Metabolic pathway of metaflumizone in rotational crops (Hoefs 2004b, 2004/1000742)

Environmental fate in water-sediment systems

Hydrolysis

Hydrolysis of [^{14}C]metaflumizone was studied by Fang (2004, 2004/7007518) in the dark at 25 °C at a concentration of approximately 1.6 µg/L in sterile aqueous buffered solutions at pH 4 (potassium phthalate), pH 5 (potassium phthalate), pH 7 (tris), and pH 9 (tris) for 30 days. Samples were analysed by solid phase extraction and by HPLC at 0, 1, 3, 7, 14/15, 21 and 30 days after treatment. Identification of transformation products was done by LC/MS.

Metaflumizone was rapidly hydrolysed at pH 4, accounting for 24% TAR after 30 days. At pH 5, hydrolysis was slower and the parent accounted for 34–48% TAR at the end of incubation. At pH 7 and pH 9, almost no transformation occurred. This demonstrates that hydrolysis is pH dependent with rapid transformation at lower pH and almost no transformation at neutral and basic pH.

At low pH, metaflumizone is hydrolytically split into two molecule parts. The major transformation product observed with the B-label was M320I04, reaching about 90% TAR after 30

days at pH 4. The two major transformation products detected with the T-label were derivatives of M320I08, which reacted with the phthalate buffer and therefore showed two peaks in the chromatograms. In total, when adding the two peaks, M320I08 accounted to about 68% TAR at the end of incubation at pH 4. An additional transformation product, reaching about 9% TAR at pH 4 at 30 days, could not be identified because of its instability during the workup process. At pH 5, the same transformation products were formed, however at a slower rate and therefore reaching lower amounts at the end of the incubation. The material balance and the distribution of radioactivity during hydrolysis of metaflumizone at various pH values are shown in Tables 30 and 31. A proposed hydrolysis pathway is shown in Figure 8.

The hydrolytic half-lives of [^{14}C]metaflumizone were approximately 6 days at pH 4 and about 2731 days at pH 5. No degradation occurred in the pH 7 and pH 9 buffer solutions.

Table 30 Recovery and distribution of radioactivity during hydrolysis of [^{14}C]metaflumizone - B-label, mean of two replicates in % of total applied radioactivity (Fang 2004, 2004/7007518)

DAT	Parent (Z-isomer)	Parent (E-isomer)	Parent (sum)	M320I04	Others [a]	Material balance
pH 4						
0	7.5	83.6	91.1	1.2	3.5	95.8
1	2.2	72.8	75.0	18.8	2.6	96.4
3	0.8	57.8	58.6	35.7	2.5	96.7
7	1.5	35.3	36.8	50.9	10.5	98.2
14	0.0	15.0	15.0	77.6	4.2	96.7
21	0.0	6.8	6.8	82.6	4.7	94.0
30	0.0	2.4	2.4	88.5	4.8	95.7
pH 5						
0	7.8	86.1	93.9	1.7	2.4	98.0
1	7.0	82.0	89.0	5.9	2.4	97.3
3	4.3	76.5	80.8	13.5	2.7	97.0
7	2.6	61.2	63.8	27.4	3.5	94.7
15	2.6	38.0	40.7	51.2	3.9	95.7
21	1.5	56.5	58.1	32.4	2.8	93.3
30	0.4	47.2	47.6	42.8	2.4	92.7
pH 7						
0	7.5	86.6	94.1	1.0	3.2	98.3
1	8.8	85.4	94.2	1.0	4.1	99.3
3	7.4	86.8	94.2	1.2	2.0	97.4
7	7.1	86.0	93.1	1.7	2.3	97.0
14	6.6	86.4	92.9	2.4	3.9	99.2
21	6.0	85.0	90.9	2.8	2.8	96.5
30	5.4	82.1	87.5	4.0	4.7	96.2
pH 9						
0	8.3	88.2	96.5	1.3	2.7	100.5
1	8.4	86.0	94.4	0.0	2.0	96.4
3	7.9	84.8	92.7	0.6	1.7	95.0
7	7.7	87.2	95.0	1.8	3.3	100.0
14	7.7	86.1	93.9	1.6	3.3	98.7
21	7.6	82.1	89.7	2.5	3.9	96.0
30	6.0	79.9	85.9	4.5	8.0	98.4

[a] Sum of all other minor peaks; none of them exceeded 3-5% TAR, except one peak at pH 4, day 7 reaching 9.7% TAR

Table 31 Recovery and distribution of radioactivity during hydrolysis of [^{14}C]metaflumizone - T-label, mean of two replicates in % of total applied radioactivity (Fang 2004, 2004/7007518)

DAT	Parent (Z-isomer)	Parent (E-isomer)	Parent (sum)	M320I08[b]	Dehydrated M320I08[b)]	Unknown t_R ~ 17.3	Others [a]	Material balance
pH 4								
0	10.6	85.7	95.9	0.0	0.0	0.0	2.1	97.9
1	2.9	78.9	81.8	13.6	0.0	0.6	1.9	97.8
3	1.6	62.9	64.5	24.1	1.3	0.0	3.8	93.7
7	1.2	44.1	56.3	35.8	1.5	6.7	4.2	93.5
15	0.0	10.2	10.2	66.6	3.2	4.9	1.3	90.3
21	0.0	13.3	13.3	48.0	12.2	1.9	4.5	80.0
30	0.0	3.5	3.5	57.5	10.9	9.0	6.4	87.4
pH 5								
0	8.7	86.9	95.6	0.7	0.0	0.0	2.0	98.3
1	7.3	86.7	94.0	2.7	0.0	0.0	1.6	98.3
3	3.4	81.5	84.9	6.0	0.0	0.0	1.7	92.5
7	3.0	85.0	78.1	12.3	0.0	0.0	3.0	93.3
15	1.7	67.7	69.5	19.9	0.0	0.0	0.0	89.3
21	1.3	52.1	53.4	28.8	0.0	0.0	4.1	86.3
30	1.5	42.8	44.3	33.8	0.3	1.6	6.5	86.5
pH 7								
0	9.2	88.9	97.2	-	-	-	1.6	98.8
1	9.1	86.5	95.6	-	-	-	1.3	96.8
3	8.6	86.5	95.1	-	-	-	1.5	96.6
7	7.9	88.6	96.5	-	-	-	2.0	98.5
15	6.0	86.9	92.9	-	-	-	1.5	94.3
21	5.6	88.2	93.8	-	-	-	2.9	96.7
30	5.7	88.2	93.8	-	-	-	3.4	97.2
pH 9								
0	9.0	88.4	97.3	-	-	0.0	1.7	99.0
1	8.8	85.0	93.9	-	-	0.0	1.8	95.7
3	9.3	85.9	95.2	-	-	0.0	1.3	96.5
7	9.3	82.6	91.9	-	-	0.0	3.7	95.6
15	8.0	86.0	94.0	-	-	0.0	2.3	96.2
21	7.8	83.5	91.3	-	-	0.5	4.5	96.2
30	7.3	79.6	86.9	-	-	0.6	6.3	93.8

[a] Sum of all other minor peaks; none of them exceeded 3-4% TAR

[b] Identified as reaction product between potassium phthalate buffer and M320I08

t_R : retention time [min]

"-": not detected, therefore not extra reported in original tables

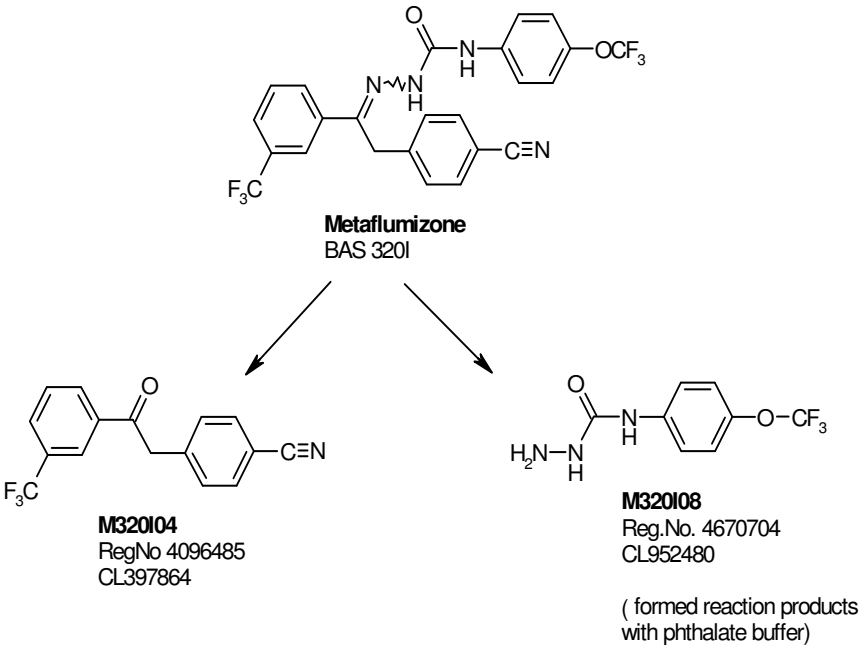


Figure 8 Proposed hydrolytical pathway of [^{14}C]metaflumizone at pH ≤ 5 (Fang 2004, 2004/7007518)

The calculations of half-lives of [^{14}C]metaflumizone were done for pH 4 and pH 5 according to simple first order kinetics. The results are shown in Table 32.

Table 32 Half-lives of [^{14}C]metaflumizone during hydrolysis (Fang 2004, 2004/7007518)

label	pH	DT_{50} first order, days	DT_{90} first order, days	r^2
benzonitrile	4	5.7	19.1	0.999
trifluoromethoxyphenyl	4	6.5	21.4	0.953
benzonitrile	5	31.4	104.4	0.733
trifluoromethoxyphenyl	5	27.3	90.6	0.984

Photolysis

The aqueous photolysis study with metaflumizone was performed by Ta (2004a, 2003/5000571 and 2004b, 2004/5000784) in sterile buffer (pH 9) using the benzonitrile and trifluoromethoxyphenyl labelled compound. The test solutions with a concentration of 0.9 µg/L metaflumizone were exposed to a xenon arc lamp (wavelength > 300 nm) continuously for 15 days in a 500 mL pyrex glass reaction vessel with a special quartz glass cover. The temperature was kept constant at 22 °C. The headspace of the vessel was continuously flushed with air and volatiles were collected in a series of trapping solutions (ethylene glycol, H_2SO_4 and NaOH). Samples were taken at 0, 0.33, 0.66, 1, 3, 7 and 15 days after treatment. Dark control samples were incubated under the same conditions except for irradiation.

For determination of the quantum yield of metaflumizone, a mixture of p-nitroacetophenone (PNAP) and pyridine was used as chemical actinometer. The vessel with the actinometer solution was irradiated under similar conditions as the other test vessels. Samples were analysed by LSC and HPLC. The photolytical breakdown products were identified by co-chromatography with reference substances and by LC/MS methods.

The results showed in Tables 33–36 that metaflumizone is extensively degraded in water under photolytic conditions. A DT50 value of 2–3 days of continuous irradiation was calculated. There are several major and minor photoproducts appearing in the water phase which could be identified as M320I04 (max. 9.7% TAR), M320I06 (max. 27.4% TAR), M320I09 (max. 6.1% TAR), M320I08 (max. 4.2% TAR), representing the different ring moieties of the parent after cleavage of the molecule. One degradate, M320I05, proved to be very volatile and was trapped in the ethylene glycol trapping solution (max. 21.3% TAR). Additionally, numerous minor non-identified photoproducts ($n > 50$, all $< 5\%$ TAR) were formed. With both labels it could be shown that even under sterile conditions, Metaflumizone was slowly but completely degraded forming finally CO_2. A proposed photolytic pathway of metaflumizone at pH 9 is shown in Figure 9. The analysis of the dark control samples demonstrated that there was no significant breakdown of metaflumizone in the absence of light at pH 9 and 22 °C.

Table 33 Recovery of radioactivity during aqueous photolysis of [^{14}C]metaflumizone (B-label); mean of two replicates in % of total applied radioactivity (Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784)

DAT	Aqueous buffer			Volatile traps				Material balance
	SPE non-retained	SPE retained, MeOH eluted	Total	NaOH (CO_2)	Ethylene glycol	H_2SO_4	Total	
irradiated								
0	0.5	100.0	100.5	np	np	np	-	100.5
0.33	4.5	93.5	98.0	0.0	0.0	0.0	0.0	98.1
0.66	4.7	93.8	98.5	0.1	0.0	0.0	0.1	98.6
1	6.2	93.7	99.9	0.1	0.1	0.1	0.3	100.2
2	18.6	79.2	97.8	0.4	0.1	0.1	0.6	98.4
3	16.2	80.7	96.9	0.5	0.2	0.1	0.7	97.6
7	30.2	68.9	99.0	1.2	0.2	0.1	1.4	100.4
15	29.9	64.3	94.2	1.7	0.3	0.2	2.2	96.4
dark control								
0	0.5	100.0	100.5	np	np	np	-	100.5
0.33	2.7	95.3	98.0	"	"	"	-	98.0
0.66	1.9	95.9	97.8	"	"	"	-	97.8
1	1.7	98.7	100.4	"	"	"	-	100.4
2	2.7	95.1	97.7	"	"	"	-	97.7
3	2.0	95.8	97.8	"	"	"	-	97.8
7	2.2	96.8	99.0	"	"	"	-	99.0
15	3.1	98.2	101.3	"	"	"	-	101.3

np: not performed

Table 34 Recovery of radioactivity during aqueous photolysis of [^{14}C]metaflumizone (T-label); mean of two replicates in % of total applied radioactivity (Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784)

DAT	Aqueous buffer			Volatile traps				Material balance
	SPE non-retained	SPE retained, MeOH eluted	Total	NaOH (CO_2)	Ethylene glycol [a]	H_2SO_4	Total	
irradiated								
0	0.1	102.0	102.1	np	np	np	-	102.1
0.33	6.1	94.1	100.2	0.1	1.1	0.1	1.4	101.6
0.66	9.3	89.4	98.7	0.2	1.7	0.1	2.1	100.7
1	14.8	81.8	96.6	0.6	2.8	0.1	3.5	100.1
2	15.6	73.4	89.0	0.7	6.0	0.2	6.8	95.8
3	20.0	63.2	83.2	2.1	11.8	0.4	14.2	97.4
7	26.3	45.5	71.8	2.5	19.6	0.8	22.9	94.7

DAT	Aqueous buffer			Volatile traps				Material balance
	SPE non-retained	SPE retained, MeOH eluted	Total	NaOH (CO_2)	Ethylene glycol [a]	H_2SO_4	Total	
15	41.1	27.3	68.3	5.5	21.3	0.5	27.3	95.6
dark control								
0	0.1	102.0	102.1	np	np	np	-	102.1
0.33	1.9	98.2	100.0	"	"	"	-	100.0
0.66	3.0	98.1	101.0	"	"	"	-	101.0
1	3.4	96.9	100.3	"	"	"	-	100.3
2	1.3	100.6	101.9	"	"	"	-	101.9
3	2.5	97.7	100.2	"	"	"	-	100.2
7	2.2	99.9	102.2	"	"	"	-	102.2
15	2.1	97.1	99.2	"	"	"	-	99.2

[a] Radioactivity was identified as M320I05

np: not performed

Table 35 Distribution of radioactivity in the buffer solution during aqueous photolysis of [^{14}C]metaflumizone (B-label); mean of two replicates in % of total applied radioactivity

(Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784).

DAT	Parent (E) ~52 min	Parent (Z) ~50 min	Parent (sum)	M320I09 ~37 min	M320I04 ~42 min	M320I06 ~19 min	unknown ~30 min	unknown ~45 min	unknown ~47 min	Polar region [a]	Others [b]
irradiated											
0	86.5	8.6	95.2	0.4	1.1	0.4	0.7	-	2.2	-	0.5
0.33	26.3	48.1	74.5	1.2	7.7	1.3	0.8	2.2	1.0	-	9.3
0.66	24.3	44.5	68.7	2.8	9.0	1.3	0.9	2.4	1.7	-	11.7
1	24.1	39.0	63.1	2.3	9.7	3.2	1.1	2.6	2.4	-	15.5
2	18.5	34.8	53.3	5.0	5.8	12.0	1.7	1.8	2.0	8.2	8.0
3	19.0	32.6	51.7	5.9	7.1	11.9	2.2	1.8	2.6	6.4	7.3
7	14.1	24.2	38.3	5.8	2.6	26.2	3.1	1.7	2.5	6.4	12.5
15	9.2	14.4	23.5	6.1	4.3	27.4	6.1	1.8	0.9	5.3	18.7
dark control											
0	86.5	8.6	85.2	0.4	1.1	0.4	0.7	-	2.2	-	0.5
0.33	82.9	8.4	81.3	-	0.6	-	-	-	1.9	-	4.3
0.66	81.7	8.9	90.7	-	0.6	1.0	-	-	2.0	-	3.6
1	85.7	7.5	93.1	-	0.6	0.7	0.8	-	2.7	-	2.5
2	81.7	8.2	89.9	-	0.8	0.7	1.1	-	2.0	-	3.3
3	81.0	8.9	89.8	-	1.0	0.6	1.1	-	2.5	-	2.8
7	79.7	8.4	88.1	0.9	1.1	-	1.2	0.6	3.7	-	3.4
15	79.7	9.1	88.8	0.9	3.5	-	1.6	0.5	1.6	-	4.3

[a] Consists of four polar peaks, each < 4% TAR

[b] Consists of multiple unknown components, each < 4% TAR

Table 36 Distribution of radioactivity in the buffer solution during aqueous photolysis of [^{14}C]metaflumizone (T-label); mean of two replicates in % of total applied radioactivity (Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784)

DAT	Parent (E) ~52 min	Parent (Z) ~50 min	Parent (sum)	M320I08 ~22.5 min	M320I05 ~22.5 min	unknown ~3.4 min	unknown ~3.9 min	unknown ~45 min	unknown ~47 min	Polar region [a]	Others [b]
irradiated											
0	87.3	9.3	96.6	3.2	1.1	-	-	1.1	-	-	0.1
0.33	34.7	44.2	78.9	1.9	0.9	2.1	-	1.6	1.0	1.9	11.9
0.66	31.5	38.4	69.8	3.1	1.3	1.6	2.5	1.5	1.8	2.2	14.8
1	20.4	42.3	62.7	3.4	1.1	0.9	2.3	1.5	2.2	6.2	16.4
2	18.2	36.8	55.0	4.2	1.7	3.2	2.0	1.5	2.8	5.8	12.9
3	14.2	27.2	41.3	4.2	1.6	3.3	0.9	1.3	2.7	6.8	21.0
7	9.1	20.3	29.4	3.0	1.9	2.8	2.1	1.2	2.2	14.4	14.8
15	4.8	10.2	15.0	2.2	1.7	6.6	7.6	0.7	0.9	18.0	15.6
dark control											
0	87.3	9.3	96.6	3.2	1.1	-	-	1.1	-	-	0.1
0.33	80.8	9.9	90.7	3.7	1.1	-	-	1.2	-	-	3.2
0.66	82.1	9.1	91.2	3.9	1.2	-	-	1.1	-	-	3.7
1	80.9	8.9	89.8	3.9	1.0	-	-	1.1	-	-	4.5
2	83.0	9.4	92.4	4.2	1.0	-	-	1.1	-	-	3.2
3	77.4	10.2	87.6	1.5	1.0	-	-	6.1	-	-	4.0
7	81.3	10.3	91.5	1.0	0.5	-	-	3.3	-	-	5.8
15	81.0	7.5	88.5	1.5	1.3	-	-	3.9	0.3	-	3.7

[a] Consists of ten polar peaks, each < 5% TAR

[b] Consists of multiple unknown components, each < 3% TAR

A non-linear first order equation was used to determine the DT_{50} and DT_{90} values for parent and photoproducts according to Gustafson-Holden. For the parent compound calculations, the entire data set was used to determine a DT_{50} result. To determine DT_{50} results for the degradation products, the starting point in the analysis was initiated on the day the peak concentration was reached for the product. The day of maximum peak concentration was day 0.

The non-linear regression was solved according to the following equation:

$$\ln C = \ln Co - \alpha \ln(1+\beta t)$$

where Co, α and β are solved for in sequence as unknowns. Dissipation times were calculated by

$$DT_{50} = [0.5-(1/\alpha)-1]/\beta$$

$$DT_{90} = [0.1-(1/\alpha)-1]/\beta$$

The following half-lives considering continuous irradiation were determined (see Table 37):

Table 37 Photolytical half-lives of [^{14}C]metaflumizone and degradates in sterile buffer (pH 9) (Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784).

	DT_{50} days	DT_{90} days	r^2
Parent, B-label	3.0	18.5	0.99
Parent, T-label	2.4	30.5	0.99
M320I04	2.8	> 58	0.64
M320I08	12.7	> 68	0.99

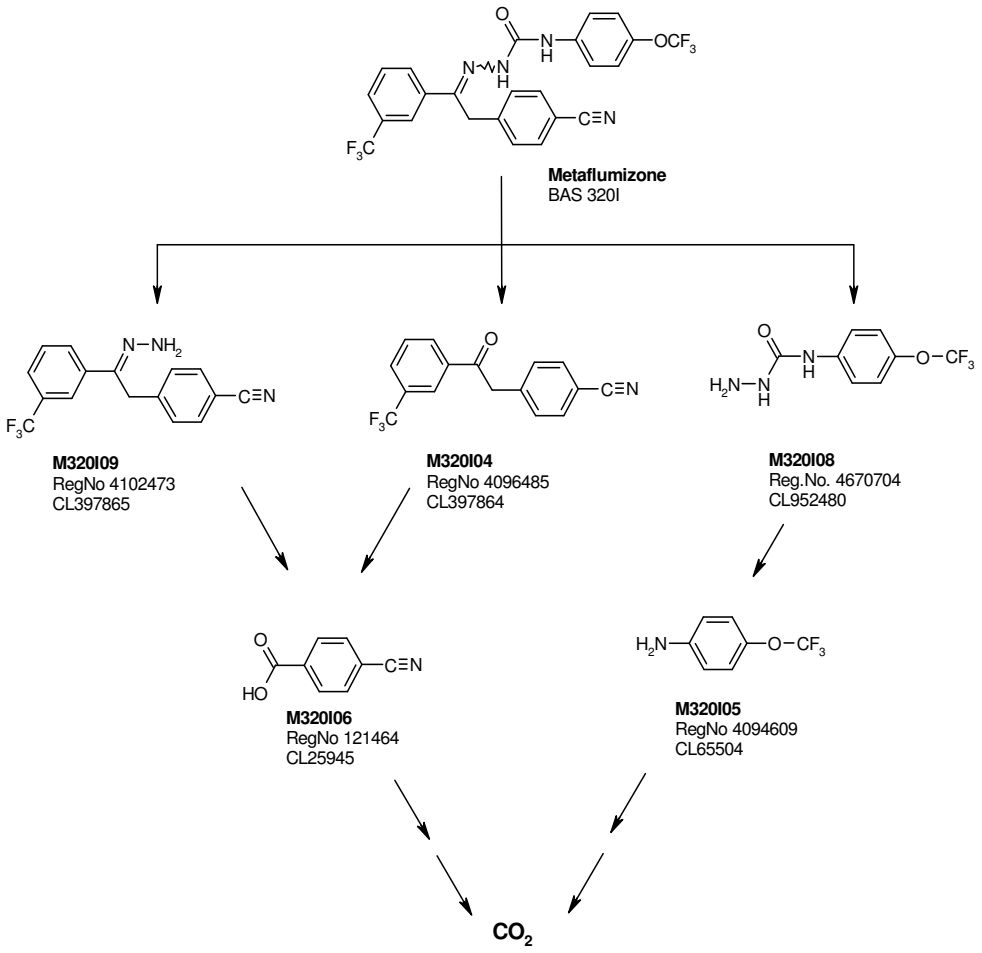


Figure 9 Proposed photolytic pathway of [^{14}C]metaflumizone in sterile buffer (pH 9) (Ta 2004a, 2003/5000571; Ta 2004b, 2004/5000784).

RESIDUE ANALYSIS

Analytical methods

Plant matrices

Metaflumizone and its metabolites M320I04 and M320I23 are extracted from plant matrices as white cabbage, tomato, cotton seed, lettuce, potato tuber, lemon, gin trash, wheat grain and potato crisps using a mixture of methanol and water. For clean-up a liquid/liquid partition against dichloromethane is used. The final determination of metaflumizone and its metabolites M320I04 and M320I23 is performed by HPLC-MS/MS. For cottonseed no clean-up is done.

For the analysis of metaflumizone and its metabolites M320I04 and M320I23 in plant oil a variant of the method is applied: The matrix is completely dissolved in isohexane. After a liquid/liquid partition against acetonitrile, the final determination is also performed by HPLC-MS/MS.

The results for recoveries are summarized in Tables 38–41.

Table 38 Summary of recoveries in food matrices for metaflumizone (E-isomer), BASF method 531/0 (Hoefs and Mackenroth 2004a, 2004/1000745)

Matrix	Fortification level (mg/kg)	Transition 507 → 178				Transition 507 → 287			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]	CV [±%]
White cabbage	0.01	5	95.1	9.1	9.6	5	92.5	8.8	9.6
	0.1	5	102.6	5.9	5.7	5	102.3	10.0	9.7
Tomato	0.01	5	78.7	6.3	8.0	5	78.5	5.4	6.9
	0.1	5	89.9	3.2	3.6	5	89.9	2.7	3.0
Cotton seed	0.01	5	78.9	2.6	3.3	5	79.3	7.8	9.9
	0.1	5	99.8	8.5	8.5	5	99.3	12.7	12.8
Lettuce	0.01	5	78.8	8.6	10.9	5	76.9	13.2	17.2
	0.1	5	86.7	16.6	19.2	5	83.8	18.1	21.7
Potato tuber	0.01	5	100.9	6.0	6.0	5	100.9	5.0	4.9
	0.1	5	102.0	5.1	5.0	5	101.4	10.4	10.3
Lemon fruit [a]	0.01	5	90.8	6.7	7.4	5	87.9	5.6	6.4
	0.1	5	88.7	2.3	2.3	5	86.5	4.2	4.9
Gin trash	0.01	5	71.3	2.7	3.7	5	79.1	4.5	5.7
	0.1	5	94.6	2.8	3.0	5	97.9	5.2	5.3
Wheat grain	0.01	5	102.3	3.6	3.6	5	100.4	4.5	4.5
	0.1	5	85.1	3.3	3.9	5	87.8	7.8	8.9
Potato crisps	0.01	5	73.6	2.2	2.9	5	71.0	3.9	5.5
	0.1	5	83.1	1.6	2.0	5	85.0	2.2	2.6
Plant oil	0.01	5	76.7	4.3	5.6	5	80.0	3.2	4.0
	0.1	5	96.4	7.4	7.7	5	93.7	8.7	9.2

[a] In the case of lemon, the second transition is 507 → 116

Table 39 Summary of recoveries in food matrices for metaflumizone (Z-isomer), BASF method 531/0 (Hoefs and Mackenroth 2004a, 2004/1000745)

Matrix	Fortification level (mg/kg)	Transition 507 → 178				Transition 507 → 287			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]	CV [±%]
White cabbage	0.01	5	92.4	8.8	9.5	5	92.8	7.2	7.8
	0.1	5	97.6	4.6	4.7	5	99.7	6.7	6.7
Tomato	0.01	5	88.6	2.0	2.3	5	89.1	4.1	4.6
	0.1	5	90.3	3.2	3.6	5	91.7	3.7	4.0
Cotton seed	0.01	5	91.9	5.1	5.5	5	92.5	6.5	7.0
	0.1	5	105.2	7.1	6.7	5	110.9	11.2	10.1
Lettuce	0.01	5	86.4	5.5	6.3	5	89.3	8.5	9.5
	0.1	5	90.7	11.3	12.5	5	92.7	13.2	14.2
Potato tuber	0.01	5	94.3	4.3	4.5	5	97.0	6.3	6.5
	0.1	5	100.2	6.3	6.3	5	95.1	3.9	4.1
Lemon fruit [a]	0.01	5	87.3	4.2	4.8	5	82.7	8.4	10.2
	0.1	5	93.5	2.0	2.1	5	88.7	4.0	4.5
Gin trash	0.01	5	80.6	1.6	2.0	5	81.9	5.2	6.3
	0.1	5	92.5	2.7	2.9	5	93.9	5.8	6.2
Wheat grain	0.01	5	95.5	2.6	2.8	5	94.7	7.6	8.0
	0.1	5	79.2	6.0	7.6	5	83.4	4.2	5.1
Potato crisps	0.01	5	80.3	3.6	4.5	5	77.5	2.9	3.7
	0.1	5	89.0	1.6	1.8	5	89.2	3.1	3.5
Plant oil	0.01	5	76.3	2.9	3.8	5	81.3	2.3	2.8
	0.1	5	92.6	5.6	6.0	5	91.6	3.9	4.3

[a] In the case of lemon, the second transition is 507 → 116

Table 40 Summary of recoveries in food matrices for M320104, BASF method 531/0 (Hoefs and Mackenroth 2004a, 2004/1000745)

Matrix	Fortification level (mg/kg)	Transition 288 → 142				Transition 288 → 114			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]]	CV [±%]
White cabbage	0.01	5	71.1	7.8	10.9	5	69.0	10.0	14.5
	0.1	5	78.1	8.1	10.4	5	75.6	6.5	8.6
Tomato	0.01	5	74.3	1.7	2.3	5	79.0	7.2	9.0
	0.1	5	78.1	2.9	3.8	5	85.0	7.4	8.7
Cotton seed	0.01	5	101.9	3.3	3.2	5	103.1	8.7	8.5
	0.1	5	107.2	7.9	7.4	5	109.8	12.1	11.0
Lettuce	0.01	5	89.8	5.9	6.5	5	87.5	5.0	5.7
	0.1	5	91.3	6.3	6.8	5	97.0	8.7	9.0
Potato tuber	0.01	5	95.8	5.5	5.8	5	94.0	6.1	6.5
	0.1	5	100.8	4.4	4.3	5	98.3	4.7	4.7
Lemon fruit	0.01	5	83.5	4.3	5.1	5	85.9	7.9	9.2
	0.1	5	83.0	2.3	2.8	5	84.9	4.2	4.9
Gin trash	0.01	5	91.0	1.6	1.8	5	83.7	3.8	4.6
	0.1	5	97.9	3.0	3.0	5	102.3	4.8	4.7
Wheat grain	0.01	5	85.8	7.8	9.0	5	83.8	10.5	12.5
	0.1	5	74.7	6.7	8.9	5	79.2	4.6	5.8
Potato crisps	0.01	5	87.4	2.7	3.1	5	90.0	1.6	1.7
	0.1	5	85.3	2.4	2.8	5	89.5	5.5	6.1
Plant oil	0.01	5	96.1	1.4	1.5	5	98.3	2.6	2.6
	0.1	5	93.5	1.4	1.5	5	95.0	2.3	2.4

Table 41 Summary of recoveries in food matrices for M320123, BASF method 531/0 (Hoefs and Mackenroth 2004a, 2004/1000745)

Matrix	Fortification level (mg/kg)	Transition 521 → 318				Transition 521 →130			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]	CV [±%]
White cabbage	0.01	5	94.4	7.7	8.2	5	93.7	5.3	5.6
	0.1	5	99.8	4.0	4.0	5	99.7	3.5	3.5
Tomato	0.01	5	92.1	3.4	3.6	5	78.8	1.3	1.7
	0.1	5	89.6	4.3	4.8	5	92.0	4.1	4.4
Cotton seed	0.01	5	102.8	2.9	2.8	5	97.7	4.2	4.3
	0.1	5	106.7	6.3	5.9	5	106.1	6.1	5.8
Lettuce	0.01	5	95.3	10.9	11.4	5	96.8	8.0	8.3
	0.1	5	92.9	5.4	5.8	5	92.8	6.6	7.1
Potato tuber	0.01	5	91.3	4.0	4.4	5	90.6	2.2	2.5
	0.1	5	100.2	6.4	6.4	5	102.3	4.8	4.7
Lemon fruit	0.01	5	90.7	3.6	4.0	5	93.0	5.0	5.3
	0.1	5	91.0	2.4	2.7	5	92.6	2.5	2.6
Gin trash	0.01	5	77.4	2.2	2.8	5	79.3	1.5	1.9
	0.1	5	92.3	5.1	5.5	5	95.2	4.2	4.4
Wheat grain	0.01	5	97.5	1.6	1.6	5	98.0	1.8	1.9
	0.1	5	88.7	5.9	6.6	5	88.2	4.2	4.7
Potato crisps	0.01	5	89.8	3.2	3.5	5	89.3	4.4	4.9
	0.1	5	99.8	3.2	3.2	5	97.5	1.7	1.7
Plant oil	0.01	5	83.9	2.4	2.9	5	79.7	0.8	1.0
	0.1	5	93.3	2.3	2.5	5	93.7	3.3	3.5

The limit of quantification was 0.01mg/kg for each of the four analytes. The standard deviations ranged between 2.0–21.7% for metaflumizone E-isomer, 1.8–14.2% for metaflumizone Z-isomer, 1.5–14.5% for M320I04 and 1.0–11.4% for M320I23 which are indicative of the method having satisfactory repeatability. Method validation results from an independent laboratory were well within the guideline requirements, demonstrating the reproducibility of the method. The results are summarized in Tables 42 to 45.

Table 42 Summary of recoveries in food matrices for metaflumizone (E-isomer), BASF method 531/1(Klimmek 2004, 2004/1006465)

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Tomato	0.01	5	101.3	1.8	1.8
	0.1	5	99.7	0.6	0.6
Potato tuber	0.01	5	103.0	4.6	4.5
	0.1	5	105.4	2.8	2.7
White cabbage	0.01	5	95.3	7.8	8.2
	0.1	5	98.5	2.8	2.8
Lemon	0.01	5	101.8	5.3	5.2
	0.1	5	104.0	1.5	1.5
Cotton seed	0.01	5	95.1	6.6	6.9
	0.1	5	100.8	2.1	2.1
Vegetable oil	0.01	5	101.2	5.0	4.9
	0.1	5	97.5	5.0	5.1
Wheat grain	0.01	5	103.8	11.2	10.8
	0.1	5	87.5	5.8	6.6

Table 43 Summary of recoveries in food matrices for metaflumizone (Z-isomer), BASF method 531/1 (Klimmek 2004, 2004/1006465)

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Tomato	0.01	5	105.4	3.7	3.5
	0.1	5	99.8	1.6	1.6
Potato tuber	0.01	5	101.6	5.6	5.5
	0.1	5	98.8	3.5	3.6
White cabbage	0.01	5	104.8	12.3	11.8
	0.1	5	99.1	2.1	2.1
Lemon	0.01	5	90.1	8.0	8.8
	0.1	5	87.5	3.7	4.2
Cotton seed	0.01	5	97.1	4.2	4.3
	0.1	5	100.4	3.8	3.8
Vegetable oil	0.01	5	97.9	5.2	5.3
	0.1	5	101.7	1.4	1.4
Wheat grain	0.01	5	88.6	11.3	12.7
	0.1	5	90.5	5.1	5.7

Table 44 Summary of recoveries in food matrices for M320104, BASF method 531/1 (Klimmek 2004, 2004/1006465)

Matrix	Fortification level [mg/kg]	n	Average Recovery [%]	SD [±%]	CV [±%]
Tomato	0.01	5	98.5	5.4	5.5
	0.1	5	107.2	1.4	1.3
Potato tuber	0.01	5	103.7	9.5	9.2
	0.1	5	109.2	7.7	7.1

Matrix	Fortification level [mg/kg]	n	Average Recovery [%]	SD [±%]	CV [±%]
White cabbage	0.01	5	96.6	12.3	12.7
	0.1	5	97.4	12.0	12.3
Lemon	0.01	5	83.7	5.9	7.0
	0.1	5	86.6	7.9	9.1
Cotton seed	0.01	5	92.3	1.6	1.8
	0.1	5	81.7	6.7	8.2
Vegetable oil	0.01	5	102.3	5.4	5.3
	0.1	5	107.4	3.3	3.1
Wheat grain	0.01	5	96.5	5.0	5.1
	0.1	5	91.9	3.2	3.5

Table 45 Summary of recoveries in food matrices for M320123, BASF method 531/1 (Klimmek 2004, 2004/1006465)

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Tomato	0.01	5	96.2	5.1	5.3
	0.1	5	102.0	1.2	1.1
Potato tuber	0.01	5	86.1	13.1	15.2
	0.1	5	106.8	1.9	1.8
White cabbage	0.01	5	85.4	9.1	10.6
	0.1	5	99.8	2.9	2.9
Lemon	0.01	5	91.0	9.8	10.8
	0.1	5	104.0	2.2	2.1
Cotton seed	0.01	5	101.9	5.9	5.8
	0.1	5	102.0	8.4	8.3
Vegetable oil	0.01	5	99.0	5.3	5.4
	0.1	5	105.3	3.4	3.2
Wheat grain	0.01	5	98.1	9.4	9.6
	0.1	5	101.0	2.7	2.6

Animal matrices

Metaflumizone is extracted from animal matrices using pure methanol. For clean-up a liquid/liquid partition against dichloromethane is used. The final determination of metaflumizone is performed by using HPLC-MS/MS. Recovery findings for the E-isomer are summarized in Table 46 and for the Z-isomer in Table 47.

Table 46 Summary of recoveries in animal matrices for metaflumizone (E-isomer), BASF method 528/0 (Tilting and Mackenroth 2004, 2004/1004634)

Matrix	Fortification level (mg/kg)	Transition 507 → 178				Transition 507 → 287			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]	CV [±%]
Muscle	0.01	5	88.5	5.3	6.0	5	90.1	8.6	9.5
	0.1	5	83.6	10.5	12.6	5	82.7	2.8	3.3
Liver	0.01	5	84.4	7.6	9.1	5	87.5	8.8	10.0
	0.1	5	80.1	1.8	2.2	5	81.6	1.5	1.9
Kidney	0.01	5	85.5	2.5	2.9	5	85.2	3.8	4.5
	0.1	5	79.8	1.9	2.4	5	79.6	1.6	2.0
Fat	0.01	5	72.5	5.1	7.0	5	78.8	6.7	8.5
	0.1	5	73.4	2.1	2.8	5	73.3	2.5	3.3
Milk	0.01	5	79.6	1.8	2.3	5	80.0	3.8	4.8
	0.1	5	81.9	2.6	3.1	5	81.2	2.6	3.1
Egg	0.01	5	84.0	2.5	3.0	5	83.8	2.4	2.9
	0.1	5	80.6	4.0	5.0	5	79.8	3.4	4.3

Table 47 Summary of recoveries in animal matrices for metaflumizone (Z-isomer), BASF method 528/0 (Tilting and Mackenroth 2004, 2004/1004634)

Matrix	Fortification level (mg/kg)	Transition 507 → 178				Transition 507 → 287			
		n	Average recovery [%]	SD [±%]	CV [±%]	n	Average recovery [%]	SD [±%]	CV [±%]
Muscle	0.01	5	93.1	6.9	7.4	5	86.9	6.0	6.9
	0.1	5	83.0	3.0	3.6	5	81.8	3.5	4.3
Liver	0.01	5	89.3	4.7	5.2	5	85.6	6.8	8.0
	0.1	5	82.5	1.7	2.1	5	83.6	1.7	2.0
Kidney	0.01	5	91.9	2.2	2.4	5	84.4	4.5	5.4
	0.1	5	84.2	1.6	1.9	5	84.3	0.7	0.9
Fat	0.01	5	74.1	4.7	6.4	5	70.3	4.9	7.0
	0.1	5	73.5	1.4	2.0	5	73.7	1.7	2.3
Milk	0.01	5	78.7	3.3	4.2	5	77.1	1.5	1.9
	0.1	5	78.9	1.4	1.7	5	78.7	1.7	2.1
Egg	0.01	5	74.3	3.4	4.6	5	75.6	2.7	3.6
	0.1	5	75.5	4.5	6.0	5	75.2	4.1	5.4

The linearity of the mass spectrometer was determined by evaluating curves generated by linear regression of the response obtained from injecting calibration standard solutions. Good linearity was observed in the range of 0.05 to 5.0 ng/mL for both analytes. The test method is an LC/MS/MS method with two specific mass transitions, m/z 507 to m/z 178 and m/z 507 to m/z 287. Since detection was carried out by this method, it can be considered that the determination of metaflumizone was highly specific. The limit of quantification for muscle (bovine and hen), liver (bovine and hen), kidney (bovine) and fat (bovine) was 0.01 mg/kg for each isomer. The limit of quantification for milk and eggs was 0.005 mg/kg for each isomer of metaflumizone. The standard deviation ranged between 1.91–2.6% for metaflumizone (E-isomer) and 1.7–7.4% for metaflumizone (Z-isomer) in a range of products of animal origin indicating acceptable repeatability. Method validation results from an independent laboratory demonstrating the reproducibility of the method. The results are summarized in Table 48 and 49.

Table 48 Summary of recoveries in animal matrices for metaflumizone (E-isomer), BASF method 528/0 (Imrie 2004, 2004/1025823)

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Bovine muscle	0.01	6	80.5	5.8	7.2
	0.02	6	82.0	3.5	4.3
	0.1	6	85.8	2.8	3.2
	0.2	6	85.5	6.1	7.1
Bovine liver	0.01	6	84.1	3.6	4.3
	0.02	6	80.5	4.8	5.9
	0.1	6	80.5	2.7	3.3
	0.2	6	76.0	2.4	3.1
Bovine kidney	0.01	6	94.3	3.7	4.0
	0.02	6	72.5	3.4	4.6
	0.1	6	84.7	6.1	7.2
	0.2	6	77.0	3.5	4.6
Bovine fat	0.01	5	93.8	7.5	8.0
	0.02	6	75.0	3.4	4.6
	0.1	6	77.6	1.6	2.1
	0.2	6	79.5	1.8	2.2
Bovine milk	0.005	5	74.6	4.3	5.8
	0.01	6	88.2	1.7	1.9
	0.05	6	111.4	4.3	3.8
	0.1	6	100.0	4.0	4.0
Hen muscle	0.01	6	79.9	10.1	12.6
	0.02	6	70.0	1.7	2.4
	0.1	6	86.3	2.3	2.6
	0.2	6	80.0	0.5	0.7
Hen liver	0.01	6	79.4	4.1	5.2
	0.02	6	72.5	3.0	4.2
	0.1	6	90.9	2.3	2.5
	0.2	6	80.5	2.6	3.2
Hen eggs	0.005	5	83.8	3.5	4.2
	0.01	6	110.0	2.0	1.8
	0.05	6	103.4	3.6	3.5
	0.1	6	97.0	1.2	1.2

Table 49 Summary of recoveries in animal matrices for metaflumizone (Z-isomer), BASF method 528/0 (Imrie 2004, 2004/1025823)

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Bovine muscle	0.01	6	81.7	7.2	8.8
	0.02	6	79.0	4.8	6.1
	0.1	6	85.7	2.5	3.0
	0.2	6	86.5	6.1	7.0
Bovine liver	0.01	6	83.5	3.4	4.1
	0.02	6	79.0	3.5	4.4
	0.1	6	83.9	3.0	3.5
	0.2	6	82.0	1.9	2.3
Bovine kidney	0.01	6	105.0	4.2	4.0
	0.02	6	79.0	4.3	5.4
	0.1	6	88.9	5.9	6.6
	0.2	6	81.5	3.5	4.3

Matrix	Fortification level [mg/kg]	n	Average recovery [%]	SD [±%]	CV [±%]
Bovine fat	0.01	5	88.0	6.4	7.3
	0.02	6	74.5	4.6	6.2
	0.1	6	77.3	1.6	2.0
	0.2	6	79.0	2.7	3.4
Bovine milk	0.005	6	79.8	6.1	7.7
	0.01	6	84.7	4.4	5.2
	0.05	6	104.0	3.7	3.5
	0.1	6	94.0	4.6	4.9
Hen muscle	0.01	6	74.3	8.9	12.0
	0.02	6	71.0	2.3	3.2
	0.1	6	87.6	2.6	3.0
	0.2	6	83.0	0.8	0.9
Hen liver	0.01	6	75.0	2.7	3.6
	0.02	6	75.5	1.3	1.8
	0.1	6	87.6	2.2	2.5
	0.2	6	82.5	1.5	1.8
Hen eggs	0.005	5	80.6	5.6	6.9
	0.01	6	91.6	1.8	2.0
	0.05	6	91.8	4.1	4.5
	0.1	6	87.2	5.0	5.8

Multi-residue method

The examination of the applicability of DFG method S 19 for the determination of residues of metaflumizone was investigated (Weber 2002, 2002/1006303). To establish if the residues of metaflumizone can be determined by gas chromatography, standard solutions of the compound at 4.0 and 0.4 µg/mL in ethyl acetate were injected into various gas chromatographic systems.

No sufficient response was achieved on a gas chromatographic (GC) system equipped with an electron capture detector (ECD) and a DB-1. Neither was there sufficient response from GC systems equipped with a nitrogen phosphorus detector (NPD) and a DB-5 capillary column and a DB-l thin film column, or on a GC system equipped with a mass selective detector (MSD) and a DB-5 MS column. On the ECD system, four small peaks were detected which derived probably from degradation products.

Since no acceptable gas chromatographic conditions were found, the multi-residue method according to DFG Method S 19 is not applicable to the determination of residues of metaflumizone.

Stability of residues in stored analytical samples

Studies with ^{14}C radiolabelled metaflumizone

The extracts of metabolism studies in lactating goats, laying hens, white cabbage and tomatoes were used to estimate the stability of metaflumizone residues in stored analytical samples.

Methanol extracts of milk, liver, kidney, muscle and fat of goats (T-label and B-label) were prepared and analysed by HPLC in May, June, July or September 2002 (Beimborn and Leibold 2004, 2004/1005042; Fabian and Knoell 2004, 2003/1019889). The reanalysis of these first extracts was performed at the end of the study. Methanol extracts were again prepared December 2003 and analysed by HPLC. The chromatograms of milk, liver, kidney, and muscle showed comparable patterns. Deviations in the chromatographic pattern of the second extract compared to the first extract were either not detectable or were very small (kidney, Label T). For fat, Label T, artefacts were detectable in the chromatographic pattern of the second extract. In contrast, the chromatographic pattern of the stored extract was comparable with the pattern of the first extract. It was concluded that

the stability of residues in animal matrices and in extracts of animal matrices was generally given for at least 18 month.

Methanol extracts of egg, liver and muscle of hens as well as methanol phases of fat (B- and T-label) were prepared in April 2002 and analysed using HPLC in April and May 2002 (Beimborn and Leibold 2003, 2004/1010610; Fabian and Glaessgen 2004, 2004/1010609). Methanol extracts were again prepared and analysed by HPLC in April 2004. The affectivity of the extraction procedures with methanol or methanol / isohexane (in the case of fat), respectively, showed no substantial alteration during storage of the samples for up to two years. The chromatograms of egg, liver, muscle and fat extracts showed comparable metabolite patterns before and after storage. As an example for the storage stability of the metabolites of metaflumizone in organic extracts, the concentrated methanol phase (T-label) of the first extraction of fat was analysed by HPLC in September 2002 and reanalysed at the end of the study in April 2004 after storage of the organic extract for more than 19 months. The chromatogram of the stored methanol phase of fat showed a similar pattern as obtained by the first analysis of the same sample.

All samples of white cabbage metabolism study were stored at approximately -18 °C during the course of the study (Rabe and Glaessgen 2004, 2004/1000747). The comparison of the metabolite patterns obtained by HPLC analysis of a concentrated methanol extract at the beginning and at the end of the investigation period showed that there was no major relevant change in the nature of the radioactive residues during storage over a period of nearly 12 months. Under the chosen conditions, the radioactive residues were stable in the methanol extracts.

Acetonitrile extracts of tomato samples (B-label) have been analysed in December 2000 and April 2002 (Afzal 2004a, 2004/5000055). The comparison of the metabolite patterns obtained by HPLC analysis showed that there was no change in the nature of the radioactive residues during storage over a period of 16 months. Under the chosen conditions, the radioactive residues were stable.

Freezer storage stability

Freezer storage stability of metaflumizone residues was investigated firstly using fortification experiments (Hoefs and Mackenroth 2004b, 2004/1015957; 2004c, 2004/1024764; 2004d, 2004/1024760) and then latterly using incurred residues due to concerns regarding instability of residues (Stewart 2005, 2004/5000736). For both fortification and incurred residues experiments the freezer conditions for storage were –20 °C in the dark and samples were analysed in duplicate for each analyte (for the fortification experiments five samples were analysed at day 0). In addition, two procedural recoveries were also analysed at each time point per analyte.

In the fortification experiments, the E-and the Z-isomer of metaflumizone were studied together. Samples were fortified using a 92.2 : 7.8 ratio of E- : Z-isomer and were analysed for both E- and Z-isomers of metaflumizone. Metabolites M320I04 and M320I23 were studied in separate fortification experiments (where each metabolite was spiked in a sample in isolation).

For metaflumizone, freezer storage stability was adequately demonstrated (e.g., less than 30% degradation) for up to two years for potato tuber, white cabbage and lettuce for the E- and Z-isomer. Storage stability for one year was demonstrated for the E-isomer in tomato and the E- and Z-isomer in cotton seed. The Z-isomer was unstable in tomatoes stored for greater than 28 days (see Tables 50 and 51).

Table 50 Storage stability of metaflumizone in plant matrices (Hoefs and Mackenroth 2004b, 2004/1015957)

Day[b]	Residues of metaflumizone [a] (mg/kg)																	
	E-Isomer										Z-Isomer							
	Tomato		Cotton seed		Potato		Lettuce		White cabbage		Tomato		Cotton seed		Potato		Lettuce		White cabbage	
0	0.44 [c]		0.44 [c]		0.43 [c]		0.47 [c]		0.48 [c]		0.04 [c]		0.05 [c]		0.04 [c]		0.04 [c]		0.04 [c]	
28	0.44	0.41	0.44	0.41	0.45	0.40	0.43	0.42	0.43	0.44	0.02	0.02	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04

Day[b]	Residues of metaflumizone [a] (mg/kg)																			
	E-Isomer										Z-Isomer									
	Tomato		Cotton seed		Potato		Lettuce		White cabbage		Tomato		Cotton seed		Potato		Lettuce		White cabbage	
77	0.42	0.43	0.43	0.45	0.45	0.44	0.46	0.45	0.47	0.45	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
182	0.34	0.33	0.38	0.35	0.48	0.43	0.41	0.41	0.44	0.43	0.01[d]	0.01	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.04
294	0.33	0.32	0.33	0.40	0.40	0.39	0.43	0.43	0.38	0.38	0.01[d]	0.01[d]	0.05	0.07	0.04	0.04	0.04	0.04	0.03	0.03
363	0.33	0.34	0.41	0.40	0.39	0.34	0.39	0.40	0.43	0.40	0.01[d]	0.01[d]	0.03	0.03	0.04	0.04	0.03	0.03	0.04	0.04
546	0.31	0.33	0.32	0.32	0.37	0.39	0.36	0.34	0.39	0.40	0.01[d]	0.01[d]	0.05	0.04	0.04	0.04	0.03	0.02	0.03	0.03
725	0.29	0.28	0.22	0.14	0.42	0.44	0.37	0.36	0.38	0.37	0.01[d]	0.01[d]	0.01	0.01[d]	0.03	0.03	0.02	0.02	0.02	0.02
	Degradation after 725 (726) days (%)																			
	30.3		28.9		9.7		20.5		20.4		74.4		33.0		stable [e]		15.9		20.5	

[a] Corrected for individual procedural recovery

[b] In case of cotton seed +/- 2 days

[c] Mean of five replicates

[d] For calculation purposes, "< 0.01" was set "0.01"

[e] In case of a negative degradation figure the compound is regarded as stable

Table 51 Procedural recoveries of metaflumizone in plant matrices (Hoefs and Mackenroth 2004b, 2004/1015957)

Day	Recoveries metaflumizone (%)																			
	E-Isomer										Z-Isomer									
	Tomato		Cotton seed		Potato		Lettuce		White cabbage		Tomato		Cotton seed		Potato		Lettuce		White cabbage	
0	87.6	88.2	67.3	72.4	86.4	87.9	80.9	82.3	79.4	84.0	84.9	85.9	74.5	71.4	83.6	87.4	86.3	84.4	83.6	84.7
28	97.6	98.7	77.7	81.4	94.5	98.3	96.8	102.2	97.5	91.3	102.1	97.0	77.1	83.6	98.6	93.7	96.4	89.9	99.4	89.5
77	87.8	89.8	82.9	76.3	91.1	87.2	86.9	89.5	87.2	91.4	91.0	96.4	83.3	92.9	89.4	86.8	91.6	86.2	90.2	89.2
182	127.0	97.4	83.1	92.0	93.9	95.4	90.7	95.2	89.7	95.5	85.0	84.2	79.4	86.3	81.3	78.0	86.8	86.2	83.3	83.9
294	93.4	107.5	75.0	88.9	91.0	100.2	87.8	-	91.5	94.7	89.2	87.6	81.6	82.1	93.0	92.8	91.2	90.8	87.2	88.9
363	93.9	87.4	86.8	85.2	94.0	92.9	87.7	87.3	90.0	90.9	99.2	96.2	90.4	82.6	93.3	86.6	91.4	88.5	87.9	82.6
546	98.7	109.1	74.0	74.6	94.0	103.4	101.9	101.6	96.5	100.1	104.4	103.4	75.3	89.8	94.7	97.4	97.8	98.4	98.4	99.4
725	91.5	95.2	100.8	81.3	75.1	78.2	86.8	91.7	91.4	94.8	97.1	101.9	83.3	94.1	95.7	99.1	96.0	94.4	96.2	98.7
Mean	96.9%		81.2%		91.5%		91.3%		91.6%		94.1%		83.0%		90.7%		91.0%		90.2%	
SD	+/- 10.4		+/- 8.4		+/- 7.4		+/- 6.8		+/- 5.2		+/- 7.2		+/- 6.6		+/- 6.3		+/- 4.5		+/- 6.2	
CV	10.7%		10.3%		8.0%		7.5%		5.6%		7.7%		7.9%		6.9%		4.9%		6.9%	
	Overall mean: 90.5% SD: +/- 9.2 % CV: 10.2%										Overall mean: 89.8% SD: +/- 7.1% CV: 7.9%									

For the metabolite M320I04, freezer storage stability was adequately demonstrated in tomato. The 70% stability in cotton seed is reached after 345 days which in this case covers the storage times used in practice. The calculation of the 70% stability for potato and white cabbage came to the results of 23 and 15 days respectively. For lettuce, 70% stability is already reached after 2 days of storage (see Tables 52 and 53).

Table 52 Storage stability of M320I04 in plant matrices (Hoefs and Mackenroth 2004c, 2004/1024764)

Day	Residues of M320I04 [a] (mg/kg)									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
0	0.48 [b]		0.52 [b]		0.43 [b]		0.50 [b]		0.50 [c]	
2	-	-	-	-	0.39	0.40	0.47	0.42	0.36	0.34
7	-	-	-	-	0.30	0.41	0.31	0.44	0.19	0.19
14	-	-	-	-	0.32	0.35	0.38	0.35	0.15	0.18

Day	Residues of M320I04 [a] (mg/kg)									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
28 [d]	0.47	0.51	0.46	0.46	0.26	0.30	0.40	0.32	0.14	0.10
50	0.45		0.49	0.46	0.31	0.31	0.46	0.51	0.05	0.07
96 [d]	0.43	0.43	0.48	0.49	0.17	0.19	0.26	0.31	0.01 [e]	0.01 [e]
182	0.48	0.43	0.37	0.39	0.16	0.19	0.19	0.19	0.01 [e]	0.01 [e]
271	0.35	0.37	0.34	0.33	0.13	0.13	0.17	0.34	-	-
362	0.43	0.45	0.33	0.29	0.09	0.19	0.14	0.14	-	-
538	0.40	0.42	0.36	0.36	0.09	0.11	0.08	0.10	-	-
	Degradation after 538 (537) days (%)									
	16.9		33.2		71.5		51.0		95.2 [f]	
	70% stability after (days)									
	4784		345		23		15		2	

[a] Corrected for individual procedural recovery

[b] Mean of five replicates

[c] Mean of ten replicates

[d] In case of cotton seed 32, 97, 266 and 537 days, respectively

[e] For calculation purposes, < 0.01 was set 0.01

[f] After 182 days

Table 53 Procedural recoveries of M320I04 in plant matrices (Hoefs and Mackenroth 2004c, 2004/1024764)

Day	Recoveries M320I04 (%)									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
0	92.5	89.5	88.5	88.6	85.0	87.0	80.0	83.4	76.9	81.7
									86.2	91.7
2	-	-	-	-	92.1	97.7	74.7	78.8	90.7	91.6
7	-	-	-	-	89.5	101.2	51.8	52.2	84.1	80.2
14	-	-	-	-	87.8	88.2	61.7	69.4	79.5	85.6
28	84.3	84.3	97.7	103.5	81.3	77.9	74.8	70.8	86.5	89.7
50	99.6	95.1	106.4	107.4	76.3	65.1	58.9	66.1	82.9	80.9
96	86.2	90.4	83.8	84.4	72.7	71.8	89.0	81.2	75.2	82.7
182	81.2	84.8	101.1	95.1	82.4	79.1	72.0	73.7	87.8	83.2
271	71.9	75.7	81.6	81.4	77.9	70.5	81.3	73.1	-	-
362	96.1	88.8	91.9	95.7	79.1	80.1	90.3	84.0	-	-
538	85.2	84.5	92.4	94.4	81.6	81.5	93.1	89.6	-	-
Mean (%)	86.9		93.4		82.1		75.0		84.3	
SD (+/-)	7.2		8.4		8.7		11.7		4.9	
CV (%)	8.3		9.0		10.6		15.6		5.8	
	Overall mean: 83.6% SD: +/- 10.4 CV: 12.5%									

The deep freeze stability of the metabolite M320I23 was investigated in tomato fruit, cotton seed, potato tuber, white cabbage and lettuce. The storage stability results show that M320I23 is stable in tomato, cotton seed, potato, white cabbage and lettuce (see Tables 54 and 55).

Table 54 Storage stability of M320I23 in plant matrices (Hoefs and Mackenroth 2004d, 2004/1024760)

Day	Residues of M320I23 [a]									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
0	0.61 [c]		0.52 [c]		0.66 [c]		0.65 [c]		0.62 [c]	
29 [b]	0.51	0.49	0.47	0.46	0.51	0.55	0.52	0.48	0.51	0.52
86 [b]	0.46	0.50	0.49	0.51	0.49	0.47	0.46	0.47	0.49	0.51
176 [b]	0.51	0.50	0.47	0.48	0.49	0.48	0.51	0.50	0.50	0.48

Day	Residues of M320I23 [a]									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
254 [b]	0.46	0.51	0.50	0.50	0.48	0.46	0.55	0.51	0.43	0.49
358 [b]	0.50	0.49	0.46	0.50	0.51	0.49	0.51	0.48	0.48	0.49
555 [b]	0.50	0.48	0.50	0.49	0.49	0.48	0.55	0.51	0.50	0.49
	Degradation after 555 (558) days (%)									
	19.1		3.3		25.9		21.5		23.0	

[a] Corrected for individual procedural recovery

[b] In case of cotton seed, the intervals were 32, 89, 179, 257, 361 and 558 days

[c] Mean of five replicates

Table 55 Procedural recoveries of M320I23 in plant matrices (Hoefs and Mackenroth 2004d, 2004/1024760)

Day	Recoveries M320I23 (%)									
	Tomato		Cotton seed		Potato		White cabbage		Lettuce	
0	99.5	102.3	86.2	86.1	96.8	98.5	100.6	98.1	95.3	109.8
29 [a]	86.9	94.5	99.0	99.2	75.2	95.8	94.3	98.1	94.0	92.9
86 [a]	104.2	102.3	111.4	104.5	99.2	96.6	96.0	97.3	92.6	99.3
176 [a]	96.2	91.2	101.2	100.5	96.1	95.3	92.9	95.8	96.3	96.8
254 [a]	97.5	93.9	100.6	97.0	102.9	99.9	93.0	99.3	95.0	104.8
358[a]	95.5	92.4	100.0	91.3	91.6	94.3	96.6	101.4	93.0	102.0
555[a]	78.6	83.8	95.6	87.9	90.6	83.7	80.6	82.6	78.8	84.8
Mean (%)	94.2		97.2		94.0		94.8		95.4	
SD (+/-)	7.3		7.2		7.1		6.1		7.7	
CV (%)	7.7		7.4		7.6		6.5		8.1	
	Overall mean: 95.1% SD: +/- 7.0 CV: 7.4%									

[a] In case of cotton seed, the intervals were 32, 89, 179, 257, 361 and 558 days

Because of the instability of the Z-isomer of metaflumizone and its metabolite M320I04, that has been observed in storage stability studies with spiked samples, a further storage stability study with residue samples from field trials was initiated, to determine if incurred residues behave in the same way (Stewart 2005, 2004/5000736). The freezer storage stability of metaflumizone was determined in field-treated cabbage, lettuce, celery, broccoli, mustard greens and tomato. Field samples that had been treated with metaflumizone were collected from the field shortly after application, analysed to establish an initial residue value and placed in freezer storage. These samples were analysed until 12 months after the initial analysis using BASF Method 531/0. Results are shown in Table 56.

Table 56 Storage stability of incurred residues of metaflumizone (Steward 2005, 2004/5000736).

Storage (days)	Metaflumizone E-isomer			Metaflumizone Z-isomer			M320I04		
	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery
Tomatoes - time between sample collection from the field and extraction for “day 0”: 33 days									
0	0.14, 0.13		102, 106	0.23, 0.24		105, 105	0.034, 0.031		101, 108
29	0.14, 0.13	100	114, 110	0.21, 0.22	91	107, 119	0.038, 0.035	112	103, 108
56	0.089, 0.099	70	83, 75	0.14, 0.15	62	84, 76	0.034, 0.036	108	82, 82
85	0.078, 0.062	52	71, 71	0.079, 0.087	35	73, 80	0.037, 0.046	128	71, 69
147	0.13, 0.13	96	96, 70	0.094, 0.12	46	97, 67	0.048, 0.068	178	97, 91

Storage (days)	Metaflumizone E-isomer			Metaflumizone Z-isomer			M320I04		
	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery
340	0.091, 0.135	84	122, 109	0.094, 0.136	49	109, 96	0.064, 0.074	212	113, 104
433	0.14, 0.26	148	117, 126	0.17, 0.26	91	115, 128	0.057, 0.078	208	107, 115
Cabbage - time between sample collection from the field and extraction for “day 0”: 3 days									
0	7.3, 6.8		115, 80	15.7, 12.2		110, 83	0.95, 0.94		106, 83
27	6.0, 5.3	80	70, 79	11.0, 10.4	77	89, 79	0.68, 0.71	74	70, 66
82	5.5, 5.8	83	109, 96	11.6, 14.1	92	107, 91	0.82, 0.80	86	102, 94
127	5.3, 5.8	79	119, 88	10.3, 10.2	73	123, 83	0.63, 0.66	68	88, 108
373	7.5, 7.0	102	80, 105	13.3, 12.7	93	102, 100	0.67, 0.64	66	95, 100
402	7.8, 9.5	123	117, 99	12.8, 15.4	101	104, 91	0.59, 0.67	67	100, 97
Broccoli - time between sample collection from the field and extraction for “day 0”: 49 days									
0	0.26, 0.25		98, 98	0.46, 0.43		96, 95	0.017, 0.017		88, 93
30	0.25, 0.24	96	112, 93	0.42, 0.42	94	108, 92	0.014, 0.014	82	100, 88
89	0.29, 0.29	114	109, 106	0.47, 0.45	103	108, 101	0.021, 0.025	135	86, 92
179	0.25, 0.28	104	102, 104	0.35, 0.35	79	104, 97	0.031, 0.036	197	83, 78
290	0.25, 0.24	96	85, 92	0.30, 0.33	71	96, 92	0.036, 0.033	203	78, 72
371	0.22, 0.21	84	104, 101	0.29, 0.30	66	104, 91	0.054, 0.055	320	94, 92
Lettuce - time between sample collection from the field and extraction for “day 0”: 109 days									
0	0.70, 0.68		107, 112	1.7, 1.7		104, 109	0.025, 0.025		88, 104
30	0.73, 0.70	104	107, 102	1.7, 1.6	97	105, 98	0.032, 0.030	124	96, 82
90	0.77, 0.74	109	124, 104	1.6, 1.6	94	118, 100	0.033, 0.029	124	85, 95
180	1.0, 0.94	141	105, 110	1.9, 1.8	109	107, 112	0.082, 0.072	308	89, 95
290	0.72, 0.63	98	88, 85	1.5, 1.3	82	92, 91	0.028, 0.028	112	77, 77
394	0.63, 0.68	95	127, 113	1.1, 1.0	62	109, 102	0.019, 0.019	76	78, 96
449	1.1, 0.9	145	124, 109	1.9, 1.5	100	120, 105	0.023, 0.021	88	65, 77
Mustard greens - time between sample collection from the field and extraction for “day 0”: 56 days									
0	6.0, 6.1		96, 94	14.9, 15.2		116, 104	0.19, 0.19		76, 90
24	5.5, 4.9	86	88, 84	16.7, 15.6	107	104, 84	0.18, 0.15	87	78, 88
82	7.0, 8.0	124	112, 113	19.8, 19.8	132	110, 97	0.30, 0.37	176	99, 104
173	10.8, 11.0	180	114, 108	15.8, 17.8	112	102, 93	0.37, 0.36	192	83, 77
296	6.5, 4.6	92	112, 91	15.7, 11.4	90	129, 90	0.41, 0.25	174	96, 86
365	4.9, 5.5	86	91, 92	13.3, 14.1	91	108, 96	0.31, 0.34	171	101, 87

Storage (days)	Metaflumizone E-isomer			Metaflumizone Z-isomer			M320I04		
	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery	mg/kg	% remaining	procedural recovery
Celery - time between sample collection from the field and extraction for "day 0": 28 days									
0	1.4, 1.7		106, 107	3.3, 3.8		105, 104	0.11, 0.13		92, 97
30	1.4, 1.5	94	111, 105	3.2, 3.5	94	110, 99	0.069, 0.074	60	71, 85
90	1.5, 1.6	100	104, 106	3.2, 3.3	92	107, 100	0.073, 0.067	58	82, 97
180	1.5, 1.4	94	103, 99	3.2, 2.6	82	109, 97	0.11, 0.09	83	100, 90
290	1.5, 1.4	94	84, 88	2.5, 2.5	70	95, 97	0.12, 0.12	100	74, 86
394	1.6, 1.4	97	112, 107	3.0, 2.6	79	102, 100	0.16, 0.16	133	

USE PATTERN

Metaflumizone is applied as a spray to the foliage or as a broadcast granular formulation (bait) to the soil. Metaflumizone has registered uses on several plant commodities. The GAPs are summarized by Codex crop group and country in Table 57 and have been assembled from labels or translations of labels provided by the manufacturer.

Table 57 Summary of national GAPs (Labels) for use of metaflumizone on food and feed crops, arranged by cropgGroup

Crop	Country	Formulation	Application					PHI Days/ Comment
			Method	kg as/ha	kg as/hL	Retreatment interval (days)	No. or max (kg ai/ha/ season)	
Citrus (Group FC01)								
Citrus (pending)	USA	GB 0.063%	Broadcast to soil	0.70 – 1.1 g as/ha	-	28 - 56	4 (4.5 g as/ha)	5
Berries and other small fruits (FB04)								
Grapes (pending)	USA	GB 0.063%	Broadcast to soil	0.70 -1.1 g as/ha	-	28 – 56	4 (4.5 g as/ha)	5
Brassica vegetables (VA09)								
Brussels sprouts	Italy	SC 240 g as/L, 22 (w/w)%	Foliar	0.24	0.014	7 – 10	2	3
Cabbage	China	SC 240 g as/L	Foliar	0.29	0.048 - 0.036	7 – 10	2 or 3	3
Cabbage	Indonesia	SC 240 g as/L	Foliar		0.018			
Cabbage	Italy	SC 240 g as/L, 22 (w/w)%	Foliar	0.24	0.024	7 – 10	2	3
Cabbage	Macedonia	SC 240 g as/L	Foliar	0.24	0.06		4	
Cabbage	Malaysia	SC 22 (w/w)%	Foliar	0.28	0.094	14	4	7
Brassica	Taiwan	SC 22 (w/w)%	Foliar		0.029	7	3	9 (slim leaf) 18 (binder leaf)

Crop	Country	Formulation	Application					PHI Days/ Comment
			Method	kg as/ha	kg as/hL	Retreatment interval (days)	No. or max (kg ai/ha/ season)	
Brassica (withdrawn 08/09)	USA	SC 240 g as/L 22 (w/w) %	Foliar	0.28		2	0.56	3
Fruiting Vegetable, Cucurbit (VC011)								
None								
Fruiting Vegetable, other than Cucurbit (VC012)								
Fruiting vegetable (withdrawn 08/09)	USA	SC 240 g as/L	Foliar	0.28			2 @ 0.28 4 @ 0.078	3
Eggplant	Italy	SC 240 g as/L 22 (w/w) %	Foliar	0.24	0.024	7 – 10	2 (3 @ 0.06 kg as/ha)	3 Green-house only
Pepper	Austria	SC 240 g as/L	Foliar	0.12 (< 50 cm ht) 0.18 (50 – 125 cm ht) 0.24 (> 125 cm ht)	0.024 0.024 0.024	7 - 14	2	1 Green-house only
Pepper	Germany	SC 240 g as/L	Foliar	0.12 (< 50 cm ht) 0.18 (50 – 125 cm ht) 0.24 (> 125 cm ht)	0.024 0.024 0.024	7 - 14	2	3 Green-house only
Pepper, chilli	Indonesia	SC 240 g as/L	Foliar		0.031			
Pepper, sweet	Italy	SC 240 g as/L 22 (w/w) %	Foliar	0.24	0.024	7 – 10	2	3 Green-house only
Pepper, red (chili)	Korea	SC 20 (w/w) %	Foliar		0.016		3	2
Pepper, sweet (bell)	Mexico	SC 240 g as/L 22 (w/w) %	Foliar	0.29	0.058 - 0.14	4 – 7	2	3
Tomato	Austria	SC 240 g as/L	Foliar	0.12 (< 50 cm ht) 0.18 (50 – 125 cm ht) 0.24 (> 125 cm ht)	0.024 0.024 0.024	7 - 14	2	1 Green-house only

Crop	Country	Formulation	Application					PHI Days/ Comment
			Method	kg as/ha	kg as/hL	Retreatment interval (days)	No. or max (kg ai/ha/ season)	
Tomato	Chile	SC 240 g as/L 24 (w/v) %	Foliar	0.24	0.024 – 0.06	10 – 15	3	3 Field and greenhouse
Tomato	Colombia	SC 240 g as/L	Foliar	0.32		7	2	3
Tomato	Germany	SC 240 g as/L	Foliar	0.12 (< 50 cm ht) 0.18 (50 – 125 cm ht) 0.24 (> 125 cm ht)		7 - 14	2	3 Green-house only
Tomato	Italy	SC 240 g as/L 22 (w/w) %	Foliar	0.24	0.024	7 – 10	2	3 Field and green-house
Tomato	Mexico	SC 240 g ae/L 22 (w/w) %	Foliar	0.29	0.058 - 0.14	4 – 7	2	3
Leafy Vegetables (including Brassica leafy) (VL013)								
Leafy vegetables (excluding Brassica) (withdrawn 08/09)	USA	SC 240 g ae/L	Foliar	0.28			2 (0.56)	3
Chinese cabbage	Korea	SC 20 (w/w) %	Foliar		0.016		2	7
Lettuce	Italy	SC 240 g ae/L 22 (w/w) %	Foliar	0.24	0.024	7 – 10	2	3 Field only
Brassica leafy	Taiwan	SC 22 (w/w)%	Foliar		0.029	7	3	9 (slim leaf) 18 (binder leaf)
Legume vegetables (VP014)								
Soya bean (immature)	Taiwan	SC 22 (w/w)%	Foliar		0.033	7		15
Root and Tuber Vegetable (VR016)								
Tuberous and corm vegetables (withdrawn 08/09)	USA	SC 240 g ae/L	Foliar	0.28		2 (4)	0.56 (0.30)	7
Potato	Austria	SC 240 g ae/L	Foliar	0.06	0.015 - 0.020	7 – 14	2	14
Potato	Croatia	SC 240 g as/L	Foliar	0.06	0.015 – 0.030	7 – 14	2	14
Potato	Germany	SC 240 g as/L	Foliar	0.06	0.015 – 0.030	7	2	-
Potato	Hungary	SC 240 g as/L	Foliar	0.06	0.015 – 0.020	21	2	-

Crop	Country	Formulation	Application					PHI Days/ Comment
			Method	kg as/ha	kg as/hL	Retreatment interval (days)	No. or max (kg ai/ha/ season)	
Potato	Italy	SC 240 g as/L 22 (w/w) %	Foliar	0.06	0.006		3	14
Potato	Macedonia	SC 240 g as/L	Foliar	0.072	0.018		4	-
Potato	Romania	SC 240 g as/L	Foliar	0.06	0.015 – 0.030	7 – 10	2	3
Potato	Serbia	SC 240 g as/L	Foliar	0.06		7 – 14	2	14
Stalk and Stem Vegetables (VS017)								
	USA	SC 240 g as/L	Foliar	0.28			2 (0.56)	3
Tree nuts (TN022)								
Tree nuts (pending)	USA	GB 0.063 (w/w) %	Broadcast to soil	0.70 – 1.1 g as/ha	-	28 - 56	4 (4.5 g as/ha)	5
Oilseed (SO023)								
Cotton (withdrawn 08/09)	USA	SC 240 g as/L	Foliar	0.28	-		1	21

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

Supervised field trials were received by the Meeting for the crops summarized below:

Commodity	Crop Group	Table No
Grapefruit (USA)	Citrus fruit	58
Lemon (USA)		59
Orange (USA)		60
Grapes (USA)	Berry fruit	61
Cabbage (USA)	Brassica vegetables	62
Cabbage (Japan)		63
Cabbage (Europe)		64
Cabbage (China)		65
Broccoli (USA)		66
Broccoli (Europe)		67
Chinese Broccoli (Taiwan)		68
Brussels Sprouts (Europe)		69
Melons (Greece and Spain)	Fruiting vegetables, Cucurbits	70
Chili Peppers (South Korea and USA)	Fruiting vegetables, other than Cucurbits	71
Peppers (USA)		72

Commodity	Crop Group	Table No
Peppers (Glasshouse: Europe)		73
Tomato (USA)		74
Tomato (Europe)		75
Tomato (Glasshouse: Europe)		76
Chinese Cabbage (Japan, Taiwan, Korea)	Leafy vegetables	77
Lettuce, head (USA)		78
Lettuce, head (Europe)		79
Lettuce, head (Glasshouse: Europe)		80
Mustard Greens (USA)		81
Spinach (USA)		82
Soyabean (immature) (Taiwan)	Legume vegetables	83
Potato (USA)	Root and tuber vegetables	84
Potato (Europe)		85
Celery (USA)	Stalk and stem vegetables	86
Almonds (USA)	Tre nuts	87
Pecans (USA)		88
Cotton (USA)	Oilseeds	89
Cotton (Europe)		90

For most field trials, metaflumizone E-isomer (BAS320I E), metaflumizone Z-isomer (BAS320I Z), metabolite M320I04, and metabolite M320I23 were determined. All reported values have been listed in the tables.

Generally, the limit of quantitation of the various analytical methods used for data collection was 0.01 mg/kg per analyte, or 0.02 mg/kg for the residue definition sum of the metaflumizone isomers (E + Z).

Results for trials conducted in accordance with the maximum GAP as reflected in a relevant approved national label are underlined. Where a residue value is greater at a PHI interval longer than the GAP PHI value, the longer PHI value is selected (underlined).

Citrus fruits

Grapefruit

Table 58 Grapefruit trials in the USA in 2006 2007: Single application of a 0.063% G formulation (S. Carringer, Report 2007/7001662)

Report No. Location (trial no.)	Application			PHI (days)	Residues on Whole Fruit (mg/kg)			
	Method	Rate kg ai/ha	Growth stage at treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001662 Oviedo, FL/2006 TCI-06-150-13	granular broadcast	0.0044	BBCH 83	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Mims, FL/2006 TCI-06-150-14	granular broadcast	0.0044	BBCH 83	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Holopaw, FL/2006 TCI-06-150-15	granular broadcast	0.0044	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Raymondville, TX/2006 TCI-06-150-16	granular broadcast	0.0044	BBCH 83	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Porterville, CA/2006 TCI-06-150-17	granular broadcast	0.0044	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Terra Bella, CA/2006 TCI-06-150-18	granular broadcast	0.0044	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Lemon

Table 59 Lemon Trials in the USA in 2006 – 2007: Single Application of a 0.063% G Formulation (S. Carringer, Report 2007/7001662)

Report No. Location (trial no.)	Application			PHI Days	Residues on Whole Fruit (mg/kg)			
	Method	Rate kg as/ha	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001662 Clermont, FL/2006 TCI-06-150-19	granular broadcast	0.0045	BBCH 83	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Somis, CA/2006 TCI-06-150-20	granular broadcast	0.0045	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Santa Paula, CA/2006 TCI-06-150-21	granular broadcast	0.0045	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Porterville, CA/2006 TCI-06-150-22	granular broadcast	0.0045	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Ivanhoe, CA/2006 TCI-06-150-23	granular broadcast	0.0045	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Orange

Table 60 Orange Trials in the USA in 2006 – 2007: Single Application of a 0.063% G Formulation (S. Carringer, Report 2007/7001662)

Report No. Location (trial no.)	Application			PHI days	Portion analysed	Residues (mg/kg)			
	Method of treatment	Rate kg as/ha	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001662 Oviedo, FL/2006 TCI-06-150-01	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
					Fruit, dropped	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Oviedo, FL/2006 TCI-06-150-01	granular broadcast	0.0224	BBCH 83	5	Fruit, dropped	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
					Oil	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Clermont, FL/2006 TCI-06-150-02	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
					Fruit, dropped	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Fellsmere, FL/2006 TCI-06-150-03	granular broadcast	0.0045	BBCH 83, Mature Fruit	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Oviedo, FL/2006 TCI-06-150-04	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
					Fruit, dropped	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Oviedo, FL/2006 TCI-06-150-04	granular broadcast	0.0224	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Mims, FL/2006 TCI-06-150-05	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Clermont, FL/2006 TCI-06-150-06	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Bitholo, FL/2006 TCI-06-150-07	granular broadcast	0.0045	BBCH 89, Mature Fruit	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Holopaw, FL/2006 TCI-06-150-08	granular broadcast	0.0045	BBCH 89	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Raymondville, TX/2006 TCI-06-150-09	granular broadcast	0.0045	BBCH 83	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Richgrove, CA/2006 TCI-06-150-10	granular broadcast	0.0045	BBCH 89	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application			PHI days	Portion analysed	Residues (mg/kg)			
	Method of treatment	Rate kg as/ha	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001662 Strathmore, CA/2006 TCI-06-150-11	granular broadcast	0.0045	BBCH 89	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001662 Porterville, CA/2006 TCI-06-150-12	granular broadcast	0.0045	BBCH 89	5	Fruit	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Berries and Other Small Fruits

Grapes

Table 61 Grape Trials in the USA in 20062: Four Application of a 0.063% G Formulation (S. Carringer, Report 2007/7001661)

Report No. Location (trial no.)	Variety	Application			PHI days	Residues (mg/kg)			
		Method of treatment	Rate kg as/ha	Growth Stage		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001661 Williamson, NY, 2006 TCI-06-151-01	Grape Cayuga	granular broadcast	0.0045	BBCH 85	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Dundee, NY, 2006 TCI-06-151-02	Grape DeChaunac	granular broadcast	0.00445	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Comstock Park, MI, 2006 TCI-06-151-03	Grape Concord	granular broadcast	0.0045	BBCH 85	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Marengo, IL, 2006 TCI-06-151-04	Grape Seedless Concord	granular broadcast	0.0045	Mature	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 St. Catharines, ON, 2006 TCI-06-151-05	Grape Seyval	granular broadcast	0.0045	BBCH 85-89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Porterville, CA, 2006 TCI-06-151-06	Grape Thompson Seedless	granular broadcast	0.0045	BBCH 89	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Dinuba, CA, 2006 TCI-06-151-07	Grape Ruby Red	granular broadcast	0.0045	BBCH 89 / Mature	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Lindsay, CA, 2006 TCI-06-151-08	Grape Crimsons	granular broadcast	0.0045	BBCH 89 / Mature Fruit	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Variety	Application			PHI days	Residues (mg/kg)			
		Method of treatment	Rate kg as/ha	Growth Stage		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001661 Richgrove, CA, 2006 TCI-06-151-09	Grape Ruby Seedless	granular broadcast	0.0045	BBCH 89 / Mature	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Hughson, CA, 2006 TCI-06-151-10	Grape Thompson Seedless	granular broadcast	0.0045	BBCH 85	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Hickman, CA, 2006 TCI-06-151-11	Grape Carignane	granular broadcast	0.0045	BBCH 85	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001661 Ephrata, WA, 2006 TCI-06-151-12	Grape White Riesling	granular broadcast	0.0045	BBCH 87	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Brassica Vegetables

Head Cabbage

Table 62 Cabbage Trials in the USA in 2002: Four Applications of a 240 g as/L SC Formulation (R. Leonard, Report 2003/5000347)

Report No. Location (trial no.)	Application					PHI (days)	Portion analysed	Residues (mg/kg)			
	Method of treatment/ Formulation	Water L/ha	kg as/ha	No. treatments and retreatment interval	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2002156 North Rome, NY/2002	broadcast/ post emergence/ 240 g as/L SC	230-234	0.29	4 RTI=7d	typ. Size, form and firmness of heads reached	0	Heads with wrapper leaves	1.15, 1.54	1.49, 1.86	0.03, 0.02	0.03, 0.04
						1		0.88, 1.09	1.24, 1.52	0.02, 0.02	0.04, 0.04
						3		0.68, 0.49	0.88, 0.70	0.02, 0.02	0.03, 0.02
						7		0.54, 0.47	0.68, 0.56	0.02, < 0.01	0.02, 0.02
						10		0.44, 0.42	0.51, 0.41	< 0.01, < 0.01	0.02, 0.02
#2003/5000347 RCN 2002156 North Rome, NY/2002	broadcast/ post emergence/ 240 g as/L SC	230-234	0.29	4 RTI=7d	typ. Size, form and firmness of heads reached	0	Heads without wrapper leaves	0.04, 0.04	0.04, 0.05	< 0.01, < 0.01	< 0.01, < 0.01
						1		0.01, 0.02	0.02, 0.01	< 0.01, < 0.01	< 0.01, < 0.01
						3		< 0.01 < 0.01	< 0.01 < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
						7		0.01, 0.02	0.01, 0.02	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Portion analysed	Residues (mg/kg)			
	Method of treatment/ Formulation	Water L/ha	kg as/ha	No. treatments and retreatment interval	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
						10		< 0.01 < 0.01	< 0.01 < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000347 RCN 2002157 Wintergarden, FL/2002	broadcast/ post emergence/ 240 g as/L SC	279-284	0.29	4 RTI=6-7d	80% of the expected head size reached	0 1 3 7 10	Heads with wrapper leaves	1.61, 2.62 1.07, 0.97 0.97, 0.76 0.87, 0.55 0.46, 0.51	1.33, 2.07 2.04, 1.80 1.83, 1.63 1.62, 1.13 0.88, 0.98	0.05, 0.07 0.10, 0.09 0.12, 0.11 0.11, 0.08 0.06, 0.1	0.03, 0.05 0.06, 0.05 0.06, 0.06 0.07, 0.06 0.06, 0.07
#2003/5000347 RCN 2002157 Wintergarden, FL/2002	broadcast/ post emergence/ 240 g as/L SC	279-284	0.29	4 RTI=6-7d	80% of the expected head size reached	0 1 3 7 10	Heads without wrapper leaves	0.14, 0.07 0.04, 0.05 0.04, 0.03 0.03, 0.01 0.03, 0.02	0.08, 0.04 0.07, 0.07 0.06, 0.06 0.05, 0.02 0.06, 0.03	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2002158 Madera, CA/2002	broadcast/ post emergence/ 240 g as/L SC	281-283	0.29	4 RTI=6-8d	80% of the expected head size reached	0 1 3 7 10	Heads with wrapper leaves	1.49, 1.48 1.15, 1.47 0.96, 1.14 1.10, 1.38 0.85, 0.58	1.92, 1.55 1.90, 2.43 1.81, 2.25 1.94, 2.22 1.73, 1.05	0.09, 0.08 0.09, 0.11 0.08, 0.10 0.07, 0.08 0.06, 0.04	0.02, 0.02 0.02, 0.03 0.02, 0.13 0.02, 0.02 0.02, 0.01
#2003/5000347 RCN 2002158 Madera, CA/2002	broadcast/ post emergence/ 240 g as/L SC	281-283	0.29	4 RTI=6-8d	80% of the expected head size reached	0 1 3 7 10	Heads without wrapper leaves	0.13, 0.12 0.05, 0.05 0.01, 0.05 0.03, < 0.01 0.04, 0.01	0.14, 0.12 0.06, 0.06 0.01, 0.04 0.04, 0.01 0.07, 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003116 Chula, GA/2003	broadcast/ post emergence/ 240 g as/L SC	218-222	0.29	4 RTI=6-7d	80% of the expected head size reached	0 1 3 7 10	Heads with wrapper leaves	0.44, 0.48 0.47, 0.50 0.15, 0.17 0.10, 0.08 0.05, 0.06	0.68, 0.81 0.91, 0.98 0.29, 0.32 0.17, 0.15 0.08, 0.12	0.02, 0.02 0.03, 0.03 0.02, 0.02 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, 0.01 0.02, 0.02 0.02, 0.02 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Portion analysed	Residues (mg/kg)			
	Method of treatment/ Formulation	Water L/ha	kg as/ha	No. treatments and retreatment interval	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2003116 Chula, GA/2003	broadcast/ post emergence/ 240 g as/L SC	218-222	0.29	4 RTI=6-7d	80% of the expected head size reached	0 1 3 7 10	Heads without wrapper leaves	0.10, 0.13 0.11, 0.11 0.07, 0.05 0.02, 0.02 0.01, 0.01	0.18, 0.23 0.22, 0.21 0.14, 0.08 0.03, 0.03 0.02, 0.02	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003117 Arkansaw, WI/2003	broadcast/ post emergence/ 240 g as/L SC	279-283	0.29	4 RTI=7d	typ. Size, form and firmness of heads reached	0 1 3 7 10	Heads with wrapper leaves	0.16, 0.14 0.08, 0.08 0.06, 0.07 0.05, 0.06 0.03, 0.03	0.21, 0.19 0.14, 0.15 0.11, 0.12 0.08, 0.10 0.05, 0.05	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003117 Arkansaw, WI/2003	broadcast/ post emergence/ 240 g as/L SC	279-283	0.29	4 RTI=7d	typ. Size, form and firmness of heads reached	0 1 3 7 10	Heads without wrapper leaves	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003118 Uvalde, TX/2003	broadcast/ post emergence/ 240 g as/L SC	230-276	0.28-0.29	4 RTI=6-8d	typ. Size, form and firmness of heads reached	0 1 3 7 10	Heads with wrapper leaves	0.32, 0.42 0.17, 0.33 0.11, 0.17 0.08, 0.09 0.05, 0.11	0.47, 0.49 0.26, 0.46 0.19, 0.30 0.34, 0.19 0.09, 0.16	0.01, 0.01 0.01, 0.03 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003118 Uvalde, TX/2003	broadcast/ post emergence/ 240 g as/L SC	230-276	0.28-0.29	4 RTI=6-8d	typ. Size, form and firmness of heads reached	0 1 3 7 9	Heads without wrapper leaves	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Table 63 Cabbage Trials in Japan in 2004: Three Applications of a 250 g as/L SC Formulation (T. Yabusaki, K. Mizukoshi, Report R-9007; T. Oumi, Report R-9005)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Rate kg as/hL	Water L/ha	No. treat-ments and retreat-ment interval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#R-9007 Iwate/Japan 2004	foliar /250 g as/L SC	0.027	3300 3500 3670	3 7 - 8	Stage 4	1 3 7	1.14 0.68 0.09	1.74 0.73 0.16	2.9 1.4 0.25	< 0.05 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05
#R-9007 Iwate/Japan 2004	foliar / 250 g as/L SC	0.027	3000 3300 3500	3 7 - 8	Stage 4	14	0.10	0.14	0.24	< 0.05	< 0.05
#R-9007 Ibaraki/Japan 2004	foliar / 250 g as/L SC	0.027	2000 2000 2000	3 7	Stage 4	1 3 7	0.42 0.30 0.08	0.74 0.52 0.11	1.2 0.82 0.19	< 0.05 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05
#R-9007 Ibaraki/Japan 2004	foliar / 250 g as/L SC	0.027	2000 2000 2000	3 7 - 8	Stage 4	14	< 0.05	< 0.05	< 0.10	< 0.05	< 0.05
#R-9005 Iwate/Japan 2004	foliar / 250 g as/L SC	0.027	3300 3500 3670	3 7 – 8	Stage 4	1 3 7	0.89 0.47 0.12	1.11 0.59 0.09	2.1 1.1 0.21	0.14 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05
#R-9005 Iwate/Japan 2004	foliar/ 250 g as/L SC	0.027	3000 3300 3500	3 7 - 8	Stage 4	14	< 0.05	< 0.05	< 0.10	< 0.05	< 0.05
#R-9005 Ibaraki/Japan 2004	Foliar/ 250 g as/L SC	0.027	2000 2000 2000	3 7	Stage 4	1 3 7	0.42 0.40 0.09	0.69 0.68 0.11	1.1 1/1 0.20	0.05 0.16 < 0.05	< 0.05 < 0.05 < 0.05
#R-9005 Ibaraki/Japan 2004	Foliar/ 250 g as/L SC	0.027	2000 2000 2000	3 6 - 7	Stage 4	14	< 0.05	< 0.05	< 0.10	< 0.05	< 0.05

Table 64 Cabbage Trials in the European Union Member States in 2004- 2005: Two Applications of a 240 g as/L SC Formulation (N. Reichert, Report 2005/1006466; N. Reichert, Report 2005/1033815)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + I	M320I04	M320I23
#2005/1006466 Oliver Kratz 16818 Wurtrau-Altfriesack Rhinweg 9 Brandenburg Germany (ACK/16/04)	Selfmade boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 49	0 3 7 14	0.14 0.18 0.02 < 0.01	0.15 0.30 0.03 0.02	0.29 0.48 0.05 0.03	< 0.01 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + I	M320I04	M320I23
#2005/1006466 Ole Gottrup 5500 Middelfart Røjleskowej 18 Fuenen Denmark (Alb/18/04)	3 I AZO knapsack precision plot boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 2 7 14	< 0.01 < 0.01 < 0.01 < 0.01	0.04 < 0.01 0.01 < 0.01	0.05 < 0.02 0.02 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006466 F. Callallos 41749 El Cuervo (Sevilla) Urb. Ei Bosque Andalucia Spain (ALO/39/04)	Schachtner boom sprayer S 5/ 240 g /L SC	400	0.24	2	BBCH 45	0 3 7 13	0.08 0.02 < 0.01 < 0.01	0.09 0.04 < 0.01 < 0.01	0.17 0.06 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2005/1006466 Thierry Huber 67203 Oberschaffolsheim 17 rue du notariat Alsace North France (FAN/24/04)	ATH boon sprayer /240 g /L SC	400	0.24	2	BBCH 49	0 3 7 13	0.13 0.04 0.03 0.03	0.05 0.04 0.03 0.03	0.18 0.08 0.06 0.06	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006466 Mr. Patel 26750 Châtillon St-Jean ZA les Flottes Rhone-Alpes South France (FBD/25/04)	ATH boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 4 7 14	0.02 0.02 < 0.01 < 0.01	0.02 0.03 0.01 < 0.01	0.04 0.05 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006466 Mr. W. Haines GL 55 6JD Chipping Campden Leasow Farms Ltd. Station Road Gloucestershire United Kingdom (OAT/18/04)	Azo small plot sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 2 7 14	0.14 0.03 < 0.01 < 0.01	0.07 0.03 < 0.01 < 0.01	0.21 0.06 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + I	M320I04	M320I23
#2005/1033815 Siedlung 1, 68723 Schwetzingen, Neurott - Baden-Württemberg Germany (DU2/04/05)	Gloria boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 49	0 3 7 14	0.08 < 0.01 < 0.01 < 0.01	0.06 < 0.01 < 0.01 < 0.01	0.14 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033815 Route de Romans 26750 Chatillons, Rhone-Alpes South France (FBD/07/05)	ATH boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 47	0 3 8 15	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033815 La Belle Métairie 72800 Thorée les pins, Pays de la Loire, North France (FBM/04/05)	boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 3 7 14	0.08 0.07 0.06 0.03	0.05 0.08 0.08 0.03	0.13 0.15 0.14 0.06	< 0.01 < 0.01 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033815 Agia Marina, 59100 Veria, Macedonia Greece (GRE/07/05)	boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 3 7 13	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2005/1033815 Norra Knästorp, 22270 Lund, Malmoe Sweden (HUS/03/05)	boom sprayer/ 240 g /L SC	400	0.24	2	BBCH 47	0 3 7 14	0.04 0.01 0.01 < 0.01	0.02 0.03 0.02 < 0.01	0.06 0.04 0.03 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033815 GL 55 6JD Chipping, Campden Leasow Farms Ltd. Station Road Gloucestershire United Kingdom (OAT/06/05)	Azo Boom Sprayer/ 240 g /L SC	400	0.24	2	BBCH 48	0 3 7 14	0.61 0.19 0.12 0.12	0.32 0.20 0.17 0.14	0.93 0.39 0.29 0.26	< 0.01 < 0.01 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Table 65 Cabbage Trials in China in 2007: Application of a 240 g as/L SC Formulation (Z. Yongquan, Report 2007/1062741)

Report No. Location	Application				Portion analysed	PHI (days)	Metaflumazone (E + Z)[a] (mg/kg)
	Method/ Formulation	Water L/ha	Rate kg as/ha	No. treatments/ Retreat-ment Interval days			
#2007/1062741 Shandong China	Spraying	675	0.576	1	cabbage cabbage cabbage cabbage cabbage cabbage cabbage	0 (2h) 1 3 7 14 21 28	19. 7.4 4.1 2.6 1.1 0.32 0.10
#2007/1062741 Hangzhou China	Spraying	675	0.576	1	cabbage cabbage cabbage cabbage cabbage cabbage cabbage	0 (2h) 1 3 7 14 21 28	29 20. 11. 4.1 2.0 1.3 0.30
#2007/1062741 Shandong China	Spraying	675	0.288	2 RTI = 7	cabbage cabbage cabbage	3 5 7	4.5 3.6 2.3
#2007/1062741 Hangzhou China	Spraying	675	0.288	2 RTI = 7	cabbage cabbage cabbage	3 5 7	4.7 3.2 1.6
#2007/1062741 Shandong China	Spraying	675	0.288	3 RTI = 7	cabbage cabbage cabbage	3 5 7	5.5 4.6 2.9
#2007/1062741 Hangzhou China	Spraying	675	0.288	3 RTI = 7	cabbage cabbage cabbage	3 5 7	4.9 3.8 1.8
#2007/1062741 Shandong China	Spraying	675	0.576	2 RTI = 7	cabbage cabbage cabbage	3 5 7	7.6 5.9 4.0
#2007/1062741 Hangzhou China	Spraying	675	0.576	2 RTI = 7	cabbage cabbage cabbage	3 5 7	8.8 6.5 4.3
#2007/1062741 Shandong China	Spraying	675	0.576	3 RTI = 7	cabbage cabbage cabbage	3 5 7	7.3 5.8 4.6
#2007/1062741 Hangzhou China	Spraying	675	0.576	3 RTI = 7	cabbage cabbage cabbage	3 5 7	10. 8.4 4.8

[a] HPLC method (232 nm) that determines total metaflumizone after acetonitrile extraction and solid phase cleanup. Control cabbage fortification (0.1, 0.5 mg/kg) had recoveries of 88 – 104%.

Table 66 Broccoli Trials in the USA in 2002 - 2003. Application of a 240 g as/L SC (R. Leonard, Report 2003/5000347)

Report No. Location (trial no.)	Application					Portion analysed	PHI (days)	Residues (mg/kg)			
	Method of treatment/ formulation	Water L/ha	kg as/ha	No of treatments and retreatment interval	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2002153 Uvalde, TX/ 2002	broadcast/ postemergence / 240 g as/L SC	198-205	0.29-0.3	4 RTI=6-8d	sprouts/ heads tightly closed	Flower head and stem	0 1 3 7 10	0.58, 0.75 0.70, 0.51 0.48, 0.42 0.25, 0.23 0.10, 0.09	0.56, 0.73 0.80, 0.52 0.66, 0.56 0.39, 0.32 0.18, 0.13	0.01, 0.02 0.03, 0.02 0.01, 0.01 0.02, 0.01 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2002154 Glenn, CA/2002	broadcast/ postemergence / 240 g as/L SC	281-283	0.29	4 RTI=7d	70% sprouts closed, 70% head diameter	Flower head and stem	0 1 3 7 10	0.62, 0.46 0.47, 0.62 0.39 0.49 0.19, 0.23 0.20, 0.13	0.30, 0.20 0.28, 0.40 0.33, 0.43 0.18, 0.20 0.17, 0.13	< 0.01, < 0.01 < 0.01 < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01<, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2002155 Madera, CA/2002	broadcast/ postemergence / 240 g as/L SC	328-333	0.29	4 RTI=7d	sprouts/ heads tightly closed	Flower head and stem	0 1 3 7 10	1.99, 2.05 1.29, 1.44 0.57, 0.54 0.34, 0.33 0.28, 0.17	0.80, 0.81 1.47, 1.66 0.79, 0.74 0.58, 0.59 0.45, 0.31	0.04, 0.04 0.05, 0.05 0.02, 0.02 0.03, 0.03 0.02, 0.01	0.01, 0.02 0.02, 0.02 < 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000347 RCN 2003113 Madera, CA/2003	broadcast/ postemergence / 240 g as/L SC	253-284	0.29	4 RTI=6-7d	40% of flowers open	Flower head and stem	0 1 3 7 10	1.13, 1.40 0.65, 0.62 0.32, 0.25 0.08, 0.08 0.02, 0.02	0.70, 0.77 1.08, 1.04 0.58, 0.44 0.12, 0.12 0.03, 0.03	0.01, 0.02 0.03, 0.03 0.03, 0.04 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 0.01, 0.01 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application					Portion analysed	PHI (days)	Residues (mg/kg)			
	Method of treatment/ formulation	Water L/ha	kg as/ha	No of treatments and retreatment interval	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2003114 Corcallis, OR/2003	broadcast/ postemergence / 240 g as/L SC	276-282	0.29-0.30	4 RTI=7d	sprouts/ heads tightly closed /1/3)	Flower head and stem	0	0.90, 0.84	0.78, 0.74	< 0.01 < 0.01	< 0.01, < 0.01
							1	0.60, 0.56	0.90, 0.86	< 0.01, < 0.01	< 0.01, < 0.01
							3	0.25, 0.23	0.43, 0.39	0.02, 0.01	< 0.01, < 0.01
							7	0.09, 0.08	0.13, 0.12	< 0.01, < 0.01	< 0.01, < 0.01
							10	0.04, 0.04	0.05, 0.05	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000347 RCN 2003115 King City, CA/2003	broadcast/ postemergence / 240 g as/L SC	281-289	0.29-0.3	4 RTI=7d		Flower head and stem	0	0.50, 0.64	0.38, 0.47	< 0.01, < 0.01	< 0.01, < 0.01
							1	0.29, 0.21	0.48, 0.35	< 0.01, < 0.01	< 0.01, < 0.01
							3	0.21, 0.16	0.33, 0.25	0.01, 0.01	< 0.01, < 0.01
							7	0.06, 0.11	0.09, 0.18	< 0.01, < 0.01	< 0.01, < 0.01
							10	0.02, 0.03	0.04, 0.05	< 0.01, < 0.01	< 0.01, < 0.01

Table 67 Broccoli Field Trials in the European Union Member States. Application of a 240 g as/L SC (E. Schroth T. Martin, Report 2008/1037453)

Report No. Location (trial no.)	Application				Portion analysed	PHI (days)	Residue (mg/kg)				
	Method of treatment/ Formu-lation	Rate kg as/ha	No. of treat-ments	Growth stage at last treat-ment (BBCH)			BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
2008/1037453 3545 Halem Limburg, Belgium (L070382)	foliar application with boom/ 240 g as/L SC	0.24	2	47	Inflorescences	0	0.37	0.22	0.59	< 0.01	< 0.01
						1	0.34	0.47	0.81	0.02	< 0.01
						3	0.34	0.55	0.89	0.03	< 0.01
						7	0.11	0.18	0.29	0.01	< 0.01
2008/1037453 GL55 6NW Ebrington Gloucestershire, U.K. (L070383)	foliar application with boom/ 240 g as/L SC	0.24	2	49	Inflorescences	0	1.01	0.60	1.6	0.01	< 0.01
						1	0.55	0.54	1.1	0.01	< 0.01
						3	0.33	0.36	0.69	0.01	< 0.01
						7	0.21	0.26	0.47	0.02	< 0.01
2008/1037453 F-35400 Saint Malo lle-Et-Vilaine, France (L070384)	foliar application with boom/ 240 g as/L SC	0.24	2	45	Inflorescences	0	0.16	0.04	0.20	< 0.01	< 0.01
						1	0.16	0.13	0.29	< 0.01	< 0.01
						3	0.10	0.10	0.20	< 0.01	< 0.01
						7	0.06	0.08	0.14	< 0.01	< 0.01

Report No. Location (trial no.)	Application				Portion analysed	PHI (days)	Residue (mg/kg)				
	Method of treatment/ Formu-lation	Rate kg as/ha	No. of treat-ments	Growth stage at last treat-ment (BBCH)			BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
2008/1037453 D-47574 Goch Kleve, Germany (L070385)	foliar application with boom/ 240 g as/L SC	0.24	2	48	Inflorescences	0 1 4 7	0.48 0.43 0.25 0.14	0.47 0.54 0.33 0.20	0.95 0.97 0.58 0.34	0.01 0.02 0.02 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2008/1037453 I-94010 Centuripe Enna, Italy (L070386)	foliar application with boom/ 240 g as/L SC	0.24	2	54	Inflorescences	0 1 3 7	0.44 0.23 0.16 0.06	0.29 0.25 0.21 0.10	0.73 0.48 0.37 0.16	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2008/1037453 E-41710 Utrera Sevilla, Spain (L070387)	foliar application with boom/ 240 g as/L SC	0.24	2	45	Inflorescences	0 1 3 7	0.38 0.47 0.28 0.12	0.23 0.29 0.33 0.16	0.61 0.76 0.61 0.28	0.01 0.01 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Trial 68 Chinese Broccoli (Chinese Kale) Field Trials in Taiwan in 2007. Application of a 2% SC formulation (Anonymous, 2008, Report 2008/1052057)

Report No. Location (trial no.)	Application					Portion analysed	PHI (days)	Residues [a] (mg/kg)
	Method of treatment/ Formulation	Water L/ha	kg as/ha	No. of treatments/ Retreat-ment interval	Growth stage at last treatment			
# 2008/1052057 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A.Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI) Taichung, Taiwan R.O.C.	Spray/ 22% SC	1000	0.320	3 RTI = 7d	Before flowering	Kale Kale Kale Kale Kale Kale Kale Kale	0 3 6 9 12 15 18 21	4.0 3.6 2.8 1.3 -- 1.2 0.13 0.02
# 2008/1052057 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A.Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI) Taichung, Taiwan R.O.C.	Spray/ 22% SC	1000	0.240	3 RTI = 7d	Before flowering	Kale Kale Kale Kale Kale Kale Kale Kale	0 3 6 9 12 15 18 21	3.9 2.9 2.8 1.2 1.3 0.93 0.04 0.01

[a] Sum of metaflumizone (E +Z), M320I203, M320I104. Only summary information provided.

Brussels sprouts

Table 69 Brussel Sprouts Field Trials in the European Union Member States. Application of 240 g as/L SC Formulation (N. Reichert, Report 2005/1033816)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2005/1006467 16818 Wustrau-Rhinweg 9 Brandenburg Germany (ACK/17/04)	Agrotop boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 48	0 2 7 14	0.05 0.08 0.02 0.02	0.03 0.08 0.04 0.04	0.08 0.16 0.06 0.06	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006467 E-41710 Finca la Deshesilla Utrera Andalucia Spain (ALO/40/04)	Schachtner boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 45	0 3 8 14	0.04 0.03 0.02 0.05	0.03 0.04 0.03 0.07	0.07 0.07 0.05 0.12	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006467 67203 Oberschaffolsheim 17 rue du notariat Alsace North France (FAN/25/04)	ATH boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 47	0 4 8 14	0.28 0.08 0.07 0.06	0.18 0.14 0.11 0.14	0.46 0.22 0.18 0.20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006467 23791 Bjärred, Borgeby slottsväg 13 Malmoe Sweden (HUS/10/04)	One-sided boom sprayer 3m/ 240 g as/L SC	400	0.240	2	BBCH 47	0 3 7 15	0.14 0.05 0.03 0.03	0.11 0.08 0.06 0.05	0.25 0.13 0.09 0.08	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1006467 15050 Castelnuovo Scrivia, Frazione Secco Piemonte Italy (ITA/28/04)	Euro-Pulve boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 45	0 3 7 13	0.17 0.11 0.12 0.07	0.11 0.16 0.23 0.15	0.28 0.27 0.35 0.22	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2005/1006467 GL 55 6JD Chipping Campden Castle Farms Station Road Gloucestershire United Kingdom (OAT/19/04)	T.E.UK Battery Powered Compressed Air Sprayer/ 240 g as/L SC	400	0.240	2	BBCH 49	0 2 7 13	0.08 0.05 0.05 0.04	0.03 0.04 0.05 0.04	0.11 0.09 0.10 0.08	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033816 6595 MS Ottersum, Zandsteeg 18 Limburg Netherlands (AGR/14/05)	Knapsack boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 49	0 4 7 14	0.06 0.04 0.04 0.04	0.04 0.07 0.07 0.07	0.10 0.11 0.11 0.11	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033816 E-41710 Finca la Deshesilla Utrera Andalucia Spain (ALO/09/05)	Schachtner boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 47	0 3 7 15	0.10 0.02 0.04 < 0.01	0.08 0.04 0.06 0.01	0.18 0.06 0.10 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033816 D-67245 Lambsheim, Mühltorstraße 24 Rheinland-Pfalz Germany (DU4/04/05)	Gloria boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 49	0 3 8 14	0.05 0.03 0.03 0.02	0.03 0.04 0.04 0.04	0.08 0.07 0.07 0.06	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033816 F-67203 Oberschaffolsheim 17 rue du notariat Alsace North France (FAN/06/05)	ATH boom sprayer/ 240 g as/L SC240 g as/L SC	400	0.240	2	BBCH 46	0 2 8 14	0.39 0.18 0.23 0.09	0.23 0.21 0.37 0.17	0.62 0.39 0.60 0.26	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2005/1033816 I-15057 Castelnuovo Scrivia, Frazione Secco Piemonte Italy (ITA/09/05)	Euro-Pulve boom sprayer/ 240 g as/L SC	400	0.240	2	BBCH 48	0 3 9 15	0.20 0.11 0.14 0.07	0.08 0.16 0.25 0.15	0.28 0.27 0.39 0.22	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1033816 GL 55 6JD Chipping, Campden Castle Farm Station Road Gloucestershire United Kingdom (OAT/08/05)	Azo Boom Sprayer/ 240 g as/L SC	400	0.240	2	BBCH 48	0 3 7 14	0.04 0.03 0.01 0.01	0.03 0.04 0.03 0.02	0.07 0.07 0.04 0.03	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Fruiting Vegetables, Cucurbits

Table 70 Melons Field Trials in Greece and Spain in 2007. Application of a 240 g as/L formulation (E. Schroth, T. Martin, Report 2008/1035868)

Report No. Location (trial no.)	Application					Portion analysed	PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formulation	Water L/ha	Rate kg as/ha	No of treatments	Growth stage at last treat-ment (BBCH)			BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2008/1035868 GR-57500 Epanomi Fhessaloniki, Greece (L070376)	foliar application with boom/ 240 g as/L SC	500	0.24	2	73	Whole fruit	0 1 3 7	0.06 0.03 0.03 < 0.01	0.07 0.05 0.02 0.01	0.13 0.08 0.05 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1035868 E-41710 Utrera Sewlla, Spain (L070377)	foliar application with boom/ 240 g as/L SC	300	0.24	2	83	Whole fruit	0 1 3 6	0.05 0.02 0.02 < 0.01	0.04 0.03 0.03 < 0.01	0.09 0.05 0.05 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Fruiting Vegetables, Other than Cucurbits

Table 71 Field Trials on Chili Peppers in the South Korea in 2006 and in the USA in 2002 - 2004. Application of SC formulations (Anonymous, Report 2007/1062861; R. Johnston, Report 2003/5000445)

Report No. Location (trial no.)	Application							PHI (days)	Residues (mg/kg)				
	Com-modity/ Variety	Method of treatment/ Form.	kg as/hL	Water L/ha	kg as/ha	No. and interval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2007/1062861 Buyeo, Chungcheongnam—do, Korea	Red pepper	Foliar spray/ 20% SC	0.02	2000		2 RTI [a] = 7 d		1 3 5 7	0.16 0.10 0.08 < 0.01			0.05 0.05 0.02 < 0.01	
#2007/1062861 Buyeo, Chungcheongnam—do, Korea	Red pepper	Foliar spray/ 20% SC	0.02	2000		3 RTI = 7 d		1 3 5 7	0.17 0.12 0.11 0.06			0.08 0.06 0.02 0.02	
#2003/5000445 RCN 2002169 Delta, CO/2002	Non-Bell Pepper/ Big Jim green chili	broadcast/ postemergence/ 240 g as/L SC		237-289	0.29-0.3	4 RTI= 6-8d	6th Fruit has reached typical size and form	0 1 3 7 10	0.15, 0.34 0.16, 0.12 0.12, 0.07 0.09, 0.05 0.09, 0.08	0.08, 0.17 0.09, 0.06 0.07, 0.14 0.04, 0.09 0.11, 0.11	0.23 0.53 0.25 0.18 0.19 0.21 0.13 0.14 0.20 0.19	< 0.01 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01
#2004/5000688 RCN 2004168 Uvalde, TX/2004	Chili Pepper / Jalopeno	high volume foliar application using boom sprayer/ 240 g as/L SC		189-198	0.29	4 RTI= 7d	BBCH 77	3	0.037, 0.024	0.075, 0.066	0.11 0.90	< 0.01, < 0.01	< 0.01, < 0.01
#2004/5000688 RCN 2004169 Madera, CA/2004	Chili Pepper/ Santa Fe Grande	high volume foliar application using boom sprayer/ 240 g as/L SC		280-282	0.29-0.3	4 RTI= 7d	BBCH 79	3	0.154, 0.164	0.385, 0.396	0.54 0.56	0.015, 0.014	< 0.01, < 0.01

Report No. Location (trial no.)	Application							PHI (days)	Residues (mg/kg)				
	Com-modity/ Variety	Method of treatment/ Form.	kg as/hL	Water L/ha	kg as/ha	No. and interval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2004/5000688 RCN 2004170 Glenn, CA/2004	Chili Pepper/ Mitla	high volume foliar application using boom sprayer/ 240 g as/L SC 240 g as/L SC		236-238	0.29	4 RTI= 7d	BBCH 85	3	0.056, 0.082	0.110, 0.162	0.17 0.24	< 0.01, < 0.01	< 0.01, < 0.01

[a] RTI – Retreatment interval

Table 72 Field trials for Sweet (Bell) Pepper in the USA in 2002. Application of a 240 g as/L formulation (R. Johnston, Report 2003/5000445)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method of treatment/ Formulation	kg as/hL	Water L/ha	kg as/ha	No of treatments and retreat-ment inteval	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000445 RCN 2002168 Verona, WI/2002	broadcast/ postemergence/		183-190	0.29 -0.3	4 RTI=7d	3rd Fruit has reached typical size and form	0 1 3 7 10	0.03, 0.02 0.01, 0.02 0.01, 0.01 0.02, 0.01 < 0.01, 0.01	0.04, 0.02 0.02, 0.03 0.02, 0.02 0.03, 0.02 0.02, 0.02	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2002170 Fresno, CA/2002	broadcast/ postemergence/ 240 g as/L SC		277-285	0.28 - 0.29	4 RTI=6-8d	Fully ripe: fruits have typical ripe color	0 1 3 7 10	0.19, 0.19 0.09, 0.25 0.20, 0.12 0.09, 0.09 0.07, 0.09	0.18, 0.17 0.10, 0.25 0.23, 0.14 0.11, 0.09 0.08, 0.10	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method of treatment/ Formulation	kg as/hL	Water L/ha	kg as/ha	No of treatments and retreat-ment inteval	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000445 RCN 2002171 Hickman, CA/2002	broadcast/ postemergence / 240 g as/L SC		273-283	0.28 - 0.29	4 RTI=7d	50% of fruits show typical fullripe color	0 1 3 7 10	0.13, 0.15 0.13, 0.09 0.09, 0.08 0.03, 0.04 0.03, 0.04	0.06, 0.11 0.06, 0.10 0.09, 0.09 0.07, 0.08 0.07, 0.10	< 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2002172 Madera, CA/2002	broadcast/ postemergence / 240 g as/L SC		278-285	0.29 -0.3	4 RTI=7d	Fully ripe: fruits have typical ripe color	0 1 3 7 10	0.36, 0.28 0.25, 0.30 0.16, 0.23 0.11, 0.15 0.10, 0.09	0.24, 0.19 0.38, 0.44 0.26, 0.39 0.18, 0.22 0.13, 0.12	0.02, 0.01 0.02, 0.02 0.01 0.02 0.01, 0.01 0.01, 0.01	< 0.01, < 0.01 < 0.01, 0.01 < 0.01, 0.01 < 0.01, 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2003127 Hobe Sound, FL/2003	broadcast/ postemergence / 240 g as/L SC		280-287	0.28 - 0.29	4 RTI=6-7d	4th Fruit has reached typical size and form	0 1 3 7 10	0.44, 0.27 0.29, 0.21 0.18, 0.18 0.08, 0.14 0.06, 0.06	0.26, 0.16 0.35, 0.25 0.27, 0.27 0.12, 0.23 0.08, 0.08	0.01, 0.01 0.02, 0.02 0.02, 0.02 < 0.01, 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2003128 Levelland, TX/2003	broadcast/ postemergence / 240 g as/L SC		238-241	0.29 -0.3	4 RTI=6-7d	80% of fruits show typical fullripe color	0 1 3 7 10	0.06, 0.16 0.08, 0.04 0.08, 0.07 0.05, 0.05 0.04, 0.03	0.16, 0.48 0.25, 0.12 0.26, 0.21 0.15, 0.13 0.11, 0.08	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2003130 Chula, GA/2003	broadcast/ postemergence / 240 g as/L SC		336-344	0.29	4 RTI=6-8d	7th Fruit has reached typical size and form	0 1 3 7 10	0.26, 0.16 0.07, 0.09 0.07, 0.10 0.02, 0.05 0.03, 0.03	0.18, 0.17 0.14, 0.18 0.13, 0.19 0.05, 0.10 0.05, 0.07	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method of treatment/ Formulation	kg as/hL	Water L/ha	kg as/ha	No of treatments and retreat-ment inteval	Growth stage at last treatment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000445 RCN 2003127 Hobe Sound, FL/2003	broadcast/ postemergence / 240 g as/L SC		280-287	0.28 - 0.29	4 RTI=6-7d	4th Fruit has reached typical size and form	0 1 3 7 10	0.44, 0.27 0.29, 0.21 0.18, 0.18 0.08, 0.14 0.06, 0.06	0.26, 0.16 0.35, 0.25 0.27, 0.27 0.12, 0.23 0.08, 0.08	0.01, 0.01 0.02, 0.02 0.02, 0.02 < 0.01, 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2003128 Levelland, TX/2003	broadcast/ postemergence / 240 g as/L SC		238-241	0.29 -0.3	4 RTI=6-7d	80% of fruits show typical fullripe color	0 1 3 7 10	0.06, 0.16 0.08, 0.04 0.08, 0.07 0.05, 0.05 0.04, 0.03	0.16, 0.48 0.25, 0.12 0.26, 0.21 0.15, 0.13 0.11, 0.08	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000445 RCN 2003130 Chula, GA/2003	broadcast/ postemergence 240 g as/L SC		336-344	0.29	4 RTI=6-8d	7th Fruit has reached typical size and form	0 1 3 7 10	0.26, 0.16 0.07, 0.09 0.07, 0.10 0.02, 0.05 0.03, 0.03	0.18, 0.17 0.14, 0.18 0.13, 0.19 0.05, 0.10 0.05, 0.07	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Table 73 Glasshouse trials for Bell Peppers in the European Union Member States in 2002 – 2003. Application of a 240 g as/L SC formulation (J. Beck, 2003, Report 2003/1001359; J. Wofford, Report 2004/5000468)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	No of treat-ment(s) and retreat-ment inteval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001359 15324 Letschin/Wollup Germany (ACK/12/02)	high volume foliar application / 240 g as/L SC	0.033	800	2 RTI = 7 d	83	0 3 8 14	0.17 0.16 0.15 0.18	0.02 0.03 0.04 0.06	0.19 0.19 0.19 0.24	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.027	800	2 RTI = 7		0 3 8 14	0.15 0.15 0.17 0.16	0.03 0.05 0.07 0.07	0.18 0.20 0.24 0.23	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	No of treat-ment(s) and retreat-ment inteval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001359 5856 CD Wellerlooi The Netherlands (AGR/17/02)	high volume foliar application / 240 g as/L SC/	0.033	800	2 RTI = 7d	87	0	0.19	0.03	0.22	< 0.01	< 0.01
						3	0.17	0.03	0.20	< 0.01	< 0.01
						7	0.13	0.03	0.16	< 0.01	< 0.01
						14	0.14	0.04	0.18	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.25	0.03	0.28	< 0.01	< 0.01
						3	0.13	0.02	0.15	< 0.01	< 0.01
						7	0.13	0.03	0.16	< 0.01	< 0.01
						14	0.01	< 0.01	0.02	< 0.01	< 0.01
#2003/1001359 41720 Los Palacios Spain (ALO/24/02)	high volume foliar application / 240 g as/L SC	0.033	800	2 RTI = 7d	75	0	0.18	0.14	0.32	< 0.01	< 0.01
						3	0.08	0.14	0.22	< 0.01	< 0.01
						7	0.05	0.10	0.15	< 0.01	< 0.01
						14	0.02	0.03	0.05	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.19	0.16	0.35	< 0.01	< 0.01
						3	0.04	0.09	0.13	< 0.01	< 0.01
						7	0.08	0.26	0.34	< 0.01	< 0.01
						14	0.02	0.05	0.07	< 0.01	< 0.01
#2003/1001359 49650 Allonnes North France (FBM/11/02)	high volume foliar application / 240 g as/L SC	0.033	800	2 RTI = 7d	87	0	0.25	0.05	0.30	< 0.01	< 0.01
						3	0.12	0.04	0.16	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.03	0.01	0.04	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.21	0.07	0.28	< 0.01	< 0.01
						3	0.12	0.06	0.18	< 0.01	< 0.01
						7	0.10	0.08	0.18	< 0.01	< 0.01
						14	0.03	0.02	0.05	< 0.01	< 0.01
#2003/1001359 15050 Isola S. Antonio Italy (ITA/21/02)	high volume foliar application / 240 g as/L SC/	0.033	800	2 RTI = 7d	85	0	0.26	0.15	0.41	< 0.01	< 0.01
						4	0.09	0.14	0.23	< 0.01	< 0.01
						7	0.08	0.16	0.24	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.10	0.26	< 0.01	< 0.01
						4	0.11	0.19	0.30	< 0.01	< 0.01
						7	0.08	0.15	0.23	< 0.01	< 0.01
						14	0.05	0.09	0.13	< 0.01	< 0.01
#2004/5000468 Limburg Netherlands (N) (AGR/07/03)	high volume foliar application	0.033	800	2 RTI = 7d	88	0	0.10	0.02	0.13	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.10	0.06	0.16	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.03	0.18	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.13	0.05	0.18	< 0.01	< 0.01
						14	0.11	0.04	0.15	< 0.01	< 0.01
#2004/5000468 Andalucia Spain (S) (AYE/03/03)	high volume foliar application	0.033	800	2 RTI = 7d	76	0	0.39	0.42	0.81	< 0.01	< 0.01
						3	0.18	0.43	0.61	< 0.01	< 0.01
						7	0.15	0.34	0.49	< 0.01	< 0.01
						14	0.10	0.24	0.34	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.26	0.29	0.55	< 0.01	< 0.01
						3	0.11	0.24	0.35	< 0.01	< 0.01
						7	0.10	0.24	0.34	< 0.01	< 0.01
						14	0.06	0.13	0.19	< 0.01	< 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	No of treat-ment(s) and retreat-ment inteval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2004/5000468 Pays de la Loire North France (FBM/04/03)	high volume foliar application	0.033	800	2 RTI = 7d	87	0	0.17	0.11	0.28	< 0.01	< 0.01
						4	0.09	0.13	0.22	< 0.01	< 0.01
						7	0.08	0.11	0.19	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.12	0.28	< 0.01	< 0.01
						4	0.13	0.21	0.34	< 0.01	< 0.01
						7	0.06	0.10	0.16	< 0.01	< 0.01
						14	0.04	0.09	0.13	< 0.01	< 0.01
#2004/5000468 Macedonia Greece (N) (GRE/04/03	high volume foliar application	0.033	800	2 RTI = 7d	72	0	0.07	0.02	0.09	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.02	0.07	< 0.01	< 0.01
						14	0.02	0.01	0.03	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.05	0.01	0.06	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.03	0.08	< 0.01	< 0.01
						14	0.05	0.05	0.10	< 0.01	< 0.01
#2004/5000468 Piemonte (S) Italy (ITA/06/03)	high volume foliar application	0.033	800	2 RTI = 7d	86	0	0.16	0.05	0.21	< 0.01	< 0.01
						3	0.09	0.07	0.16	< 0.01	< 0.01
						7	0.06	0.06	0.12	< 0.01	< 0.01
						14	0.08	0.09	0.17	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.06	0.21	< 0.01	< 0.01
						3	0.06	0.05	0.11	< 0.01	< 0.01
						7	0.07	0.06	0.13	< 0.01	< 0.01
						14	0.09	0.09	0.18	< 0.01	< 0.01
#2004/5000468 Limburg Netherlands (N) (AGR/07/03)	high volume foliar application	0.033	800	2 RTI = 7d	88	0	0.10	0.02	0.12	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.10	0.06	0.16	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.03	0.18	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.13	0.05	0.18	< 0.01	< 0.01
						14	0.11	0.04	0.15	< 0.01	< 0.01
#2004/5000468 Andalucia Spain (S) (AYE/03/03)	high volume foliar application	0.033	800	2 RTI = 7d	76	0	0.39	0.42	0.81	< 0.01	< 0.01
						3	0.18	0.43	0.61	< 0.01	< 0.01
						7	0.15	0.34	0.49	< 0.01	< 0.01
						14	0.10	0.24	0.34	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.26	0.29	0.55	< 0.01	< 0.01
						3	0.11	0.24	0.35	< 0.01	< 0.01
						7	0.10	0.24	0.34	< 0.01	< 0.01
						14	0.06	0.13	0.19	< 0.01	< 0.01
#2004/5000468 Pays de la Loire France (N) (FBM/04/03)	high volume foliar application	0.033	800	2 RTI = 7d	87	0	0.17	0.11	0.28	< 0.01	< 0.01
						4	0.09	0.13	0.22	< 0.01	< 0.01
						7	0.08	0.11	0.19	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.12	0.28	< 0.01	< 0.01
						4	0.13	0.21	0.24	< 0.01	< 0.01
						7	0.06	0.10	0.16	< 0.01	< 0.01
						14	0.04	0.09	0.13	< 0.01	< 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	No of treat-ment(s) and retreat-ment inteval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2004/5000468 Macedonia Greece (N) (GRE/04/03	high volume foliar application	0.033	800	2 RTI = 7d	72	0	0.07	0.02	0.09	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.02	0.07	< 0.01	< 0.01
						14	0.02	0.01	0.03	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.05	0.01	0.06	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.03	0.08	< 0.01	< 0.01
						14	0.05	0.05	0.10	< 0.01	< 0.01
#2004/5000468 Piemonte (S) Italy (ITA/06/03)	high volume foliar application	0.033	800	2 RTI = 7d	86	0	0.16	0.05	0.21	< 0.01	< 0.01
						3	0.09	0.07	0.16	< 0.01	< 0.01
						7	0.06	0.06	0.12	< 0.01	< 0.01
						14	0.08	0.09	0.17	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.06	0.21	< 0.01	< 0.01
						3	0.06	0.05	0.11	< 0.01	< 0.01
						7	0.07	0.06	0.13	< 0.01	< 0.01
						14	0.09	0.09	0.18	< 0.01	< 0.01

Tomato

Table 74 Tomato Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC (R. Johnston, Report 2003/5000445)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formulation	kg as/hL	Water L/ha	No RTI	Growth stage		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001359 15324 Letschin/Wollup Germany (ACK/12/02)	high volume foliar application/ 240 g as/L SC	0.033	800	2 RTI = 7 d	83	0	0.17	0.02	0.19	< 0.01	< 0.01
						3	0.16	0.03	0.19	< 0.01	< 0.01
						8	0.15	0.04	0.19	< 0.01	< 0.01
						14	0.18	0.06	0.24	< 0.01	< 0.01
		0.027	800	2 RTI = 7		0	0.15	0.03	0.18	< 0.01	< 0.01
						3	0.15	0.05	0.20	< 0.01	< 0.01
						8	0.17	0.07	0.24	< 0.01	< 0.01
						14	0.16	0.07	0.23	< 0.01	< 0.01
#2003/1001359 5856 CD Wellerlooi The Netherlands (AGR/17/02)	high volume foliar application / 240 g as/L SC/	0.033	800	2 RTI = 7d	87	0	0.19	0.03	0.22	< 0.01	< 0.01
						3	0.17	0.03	0.20	< 0.01	< 0.01
						7	0.13	0.03	0.16	< 0.01	< 0.01
						14	0.14	0.04	0.18	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.25	0.03	0.28	< 0.01	< 0.01
						3	0.13	0.02	0.15	< 0.01	< 0.01
						7	0.13	0.03	0.16	< 0.01	< 0.01
						14	0.01	< 0.01	0.02	< 0.01	< 0.01
#2003/1001359 41720 Los Palacios Spain (ALO/24/02)	high volume foliar application / 240 g as/L SC	0.033	800	2 RTI = 7d	75	0	0.18	0.14	0.32	< 0.01	< 0.01
						3	0.08	0.14	0.22	< 0.01	< 0.01
						7	0.05	0.10	0.15	< 0.01	< 0.01
						14	0.02	0.03	0.05	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.19	0.16	0.35	< 0.01	< 0.01
						3	0.04	0.09	0.13	< 0.01	< 0.01
						7	0.08	0.26	0.34	< 0.01	< 0.01
						14	0.02	0.05	0.07	< 0.01	< 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formulation	kg as/hL	Water L/ha	No RTI	Growth stage		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001359 49650 Allonnes North France (FBM/11/02)	high volume foliar application / 240 g as/L SC	0.033	800	2 RTI = 7d	87	0	0.25	0.05	0.30	< 0.01	< 0.01
						3	0.12	0.04	0.16	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.03	0.01	0.04	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.21	0.07	0.28	< 0.01	< 0.01
						3	0.12	0.06	0.18	< 0.01	< 0.01
						7	0.10	0.08	0.18	< 0.01	< 0.01
						14	0.03	0.02	0.05	< 0.01	< 0.01
#2003/1001359 15050 Isola S. Antonio Italy (ITA/21/02)	high volume foliar application / 240 g as/L SC/	0.033	800	2 RTI = 7d	85	0	0.26	0.15	0.41	< 0.01	< 0.01
						4	0.09	0.14	0.23	< 0.01	< 0.01
						7	0.08	0.16	0.24	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.10	0.26	< 0.01	< 0.01
						4	0.11	0.19	0.30	< 0.01	< 0.01
						7	0.08	0.15	0.23	< 0.01	< 0.01
						14	0.05	0.09	0.13	< 0.01	< 0.01
#2004/5000468 Limburg Netherlands (N) (AGR/07/03)	high volume foliar application	0.033	800	2 RTI = 7d	88	0	0.10	0.02	0.13	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.10	0.06	0.16	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.03	0.18	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.13	0.05	0.18	< 0.01	< 0.01
						14	0.11	0.04	0.15	< 0.01	< 0.01
#2004/5000468 Andalucia Spain (S) (AYE/03/03)	high volume foliar application	0.033	800	2 RTI = 7d	76	0	0.39	0.42	0.81	< 0.01	< 0.01
						3	0.18	0.43	0.61	< 0.01	< 0.01
						7	0.15	0.34	0.49	< 0.01	< 0.01
						14	0.10	0.24	0.34	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.26	0.29	0.55	< 0.01	< 0.01
						3	0.11	0.24	0.35	< 0.01	< 0.01
						7	0.10	0.24	0.34	< 0.01	< 0.01
						14	0.06	0.13	0.19	< 0.01	< 0.01
#2004/5000468 Andalucia Spain (S) (AYE/03/03)	high volume foliar application	0.033	800	2 RTI = 7d	87	0	0.17	0.11	0.28	< 0.01	< 0.01
						4	0.09	0.13	0.22	< 0.01	< 0.01
						7	0.08	0.11	0.19	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.12	0.28	< 0.01	< 0.01
						4	0.13	0.21	0.34	< 0.01	< 0.01
						7	0.06	0.10	0.16	< 0.01	< 0.01
						14	0.04	0.09	0.13	< 0.01	< 0.01
#2004/5000468 Pays de la Loire North France (FBM/04/03)	high volume foliar application	0.033	800	2 RTI = 7d	72	0	0.07	0.02	0.09	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.02	0.07	< 0.01	< 0.01
						14	0.02	0.01	0.03	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.05	0.01	0.06	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.03	0.08	< 0.01	< 0.01
						14	0.05	0.05	0.10	< 0.01	< 0.01
#2004/5000468 Macedonia Greece (N) (GRE/04/03	high volume foliar application	0.033	800	2 RTI = 7d	72	0	0.07	0.02	0.09	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.02	0.07	< 0.01	< 0.01
						14	0.02	0.01	0.03	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.05	0.01	0.06	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.03	0.08	< 0.01	< 0.01

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formulation	kg as/hL	Water L/ha	No RTI	Growth stage		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
						14	0.05	0.05	0.10	< 0.01	< 0.01
#2004/5000468 Piemonte (S) Italy (ITA/06/03)	high volume foliar application	0.033	800	2 RTI = 7d	86	0	0.16	0.05	0.21	< 0.01	< 0.01
						3	0.09	0.07	0.16	< 0.01	< 0.01
						7	0.06	0.06	0.12	< 0.01	< 0.01
						14	0.08	0.09	0.17	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.06	0.21	< 0.01	< 0.01
						3	0.06	0.05	0.11	< 0.01	< 0.01
						7	0.07	0.06	0.13	< 0.01	< 0.01
						14	0.09	0.09	0.18	< 0.01	< 0.01
#2004/5000468 Limburg Netherlands (N) (AGR/07/03)	high volume foliar application	0.033	800	2 RTI = 7d	88	0	0.10	0.02	0.12	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.08	0.03	0.11	< 0.01	< 0.01
						14	0.10	0.06	0.16	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.03	0.18	< 0.01	< 0.01
						3	0.13	0.04	0.17	< 0.01	< 0.01
						7	0.13	0.05	0.18	< 0.01	< 0.01
						14	0.11	0.04	0.15	< 0.01	< 0.01
#2004/5000468 Andalucia Spain (S) (AYE/03/03)	high volume foliar application	0.033	800	2 RTI = 7d	76	0	0.39	0.42	0.81	< 0.01	< 0.01
						3	0.18	0.43	0.61	< 0.01	< 0.01
						7	0.15	0.34	0.49	< 0.01	< 0.01
						14	0.10	0.24	0.34	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.26	0.29	0.55	< 0.01	< 0.01
						3	0.11	0.24	0.35	< 0.01	< 0.01
						7	0.10	0.24	0.34	< 0.01	< 0.01
						14	0.06	0.13	0.19	< 0.01	< 0.01
#2004/5000468 Pays de la Loire France (N) (FBM/04/03)	high volume foliar application	0.033	800	2 RTI = 7d	87	0	0.17	0.11	0.28	< 0.01	< 0.01
						4	0.09	0.13	0.22	< 0.01	< 0.01
						7	0.08	0.11	0.19	< 0.01	< 0.01
						14	0.04	0.07	0.11	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.16	0.12	0.28	< 0.01	< 0.01
						4	0.13	0.21	0.24	< 0.01	< 0.01
						7	0.06	0.10	0.16	< 0.01	< 0.01
						14	0.04	0.09	0.13	< 0.01	< 0.01
#2004/5000468 Macedonia Greece (N) (GRE/04/03	high volume foliar application	0.033	800	2 RTI = 7d	72	0	0.07	0.02	0.09	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.02	0.07	< 0.01	< 0.01
						14	0.02	0.01	0.03	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.05	0.01	0.06	< 0.01	< 0.01
						4	0.05	0.02	0.07	< 0.01	< 0.01
						7	0.05	0.03	0.08	< 0.01	< 0.01
						14	0.05	0.05	0.10	< 0.01	< 0.01
#2004/5000468 Piemonte (S) Italy (ITA/06/03)	high volume foliar application	0.033	800	2 RTI = 7d	86	0	0.16	0.05	0.21	< 0.01	< 0.01
						3	0.09	0.07	0.16	< 0.01	< 0.01
						7	0.06	0.06	0.12	< 0.01	< 0.01
						14	0.08	0.09	0.17	< 0.01	< 0.01
		0.027	800	2 RTI = 7d		0	0.15	0.06	0.21	< 0.01	< 0.01
						3	0.06	0.05	0.11	< 0.01	< 0.01
						7	0.07	0.06	0.13	< 0.01	< 0.01
						14	0.09	0.09	0.18	< 0.01	< 0.01

Table 75 Tomato Field Trials in European Union Member States (South) in 2003 - 2004. Application of a 240 g as/L SC (E. Schroth, Report 2004/1006476; E. Schroth, Report 2004/1024762)

Report No. Location (trial no.)	Method of treatment/ Formu-lation	Application rate per treatment			No of treat-ments	Growth stage at last treat-ment	PHI (days)	Residues (mg/kg)				
		kg as/hL	Water L/ha	kg as/ha				BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
2004/1006476 E-41700 D.Hermanas Sevilla, Spain (ALO/27/03)	foliar application with boom/ 240 g as/L SC	0.044	600	0.26	2	83	0 3 7 14	0.04 0.01 < 0.01 < 0.01	0.03 0.02 0.02 0.01	0.07 0.03 0.03 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.036	600	0.22	2	83	0 3 7 14	0.04 < 0.01 < 0.01 < 0.01	0.03 0.01 0.01 0.01	0.07 0.02 0.02 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2004/1006476 E-41400 Lebrija Sevilla, Spain (ALO/28/03)	foliar application with boom/ 240 g as/L SC	0.044	600	0.26	2	85	0 3 7 14	0.05 0.02 < 0.01 < 0.01	0.06 0.04 0.02 0.02	0.11 0.06 0.03 0.03	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.036	600	0.22	2	85	0 3 7 14	0.05 0.02 < 0.01 < 0.01	0.06 0.05 0.02 0.01	0.13 0.07 0.03 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2004/1006476 E-11560 Trebujena Cádiz, Spain (ALO/29/03)	foliar application with boom/ 240 g as/L SC	0.044	600	0.26	2	85	0 3 7 13	0.06 0.01 < 0.01 < 0.01	0.06 0.03 0.01 < 0.01	0.12 0.04 0.02 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.036	600	0.22	2	85	0 3 7 13	0.04 < 0.01 < 0.01 < 0.01	0.04 0.02 0.01 < 0.01	0.08 0.03 0.02 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2004/1006476 E-41808 Villanueva Sevilla, Spain (ALO/30/03)	foliar application with lance/ 240 g as/L SC	0.044	600	0.26	2	81	0 3 7 14	0.01 0.01 < 0.01 < 0.01	0.02 0.02 < 0.01 < 0.01	0.03 0.03 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.036	600	0.22	2	81	0 3 7 14	< 0.01 < 0.01 < 0.01 < 0.01	0.01 0.01 0.01 < 0.01	< 0.02 0.02 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
2004/1006476 E-11560 Trebujena Cádiz, Spain (ALO/29/03)	foliar application with boom	0.044	600	0.26	2 .	85	0 3 7 13	0.06 0.01 < 0.01 < 0.01	0.06 0.03 0.01 < 0.01	0.12 0.04 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
		0.036	600	0.22	2	85	0 3 7 13	0.04 < 0.01 < 0.01 < 0.01	0.04 0.02 0.01 < 0.01	0.08 0.03 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Method of treatment/ Formu-lation	Application rate per treatment			No of treat-ments	Growth stage at last treat-ment	PHI (days)	Residues (mg/kg)				
		kg as/hL	Water L/ha	kg as/ha				BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
2004/1006476 E-41808 Villanueva Sevilla, Spain (ALO/30/03)	foliar application with lance	0.044	600	0.26	2	81	0	0.01	0.02	0.03	< 0.01	< 0.01
							3	0.01	0.02	0.03	< 0.01	< 0.01
							7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							14	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
		0.036	600	0.22	2	81	0	< 0.01	0.01	0.02	< 0.01	< 0.01
							3	< 0.01	0.01	0.02	< 0.01	< 0.01
							7	< 0.01	0.01	0.02	< 0.01	< 0.01
							14	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
2004/1024762 E-41727 Maribañez Sevilla, Spain (ALO/11/04)	foliar application with boom	0.04	600	0.24	2	85	0	0.010	0.050	0.15	< 0.01	< 0.01
							3	0.030	0.050	0.080	0.010	< 0.01
							7	0.020	0.050	0.070	0.010	< 0.01
							14	0.010	0.020	0.030	< 0.01	< 0.01
	foliar application with lance	0.04	600	0.24	2	84	0	0.120	0.100	0.22	< 0.01	< 0.01
							3	0.020	0.050	0.070	< 0.01	< 0.01
							7	0.030	0.070	0.10	< 0.01	< 0.01
							14	0.020	0.050	0.070	< 0.01	< 0.01
2004/1024762 E-41710 Utrera Sevilla, Spain (ALO/12/04)	foliar application with boom	0.04	600	0.24	2	88	0	0.080	0.070	0.15	0.010	< 0.01
							3	0.050	0.090	0.14	0.020	< 0.01
							7	0.020	0.040	0.060	0.010	< 0.01
							15	0.010	0.030	0.040	< 0.01	< 0.01
	foliar application with boom	0.04	600	0.24	2	85	0	0.070	0.040	0.11	< 0.01	< 0.01
							3	0.040	0.070	0.11	0.010	< 0.01
							7	0.020	0.030	0.050	< 0.01	< 0.01
							14	0.020	0.040	0.060	< 0.01	< 0.01
2004/1024762 I-27050 Corana Italy (ITA/04/04)	foliar application with lance	0.044	600	0.26	2	81	0	0.01	0.02	0.03	< 0.01	< 0.01
							3	0.01	0.02	0.03	< 0.01	< 0.01
							7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							14	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
		0.036	600	0.22	2	81	0	< 0.01	0.01	0.02	< 0.01	< 0.01
							3	< 0.01	0.01	0.02	< 0.01	< 0.01
							7	< 0.01	0.01	0.02	< 0.01	< 0.01
							14	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
2004/1024762 I-15072 Casalcermelli Italy (ITA/05/04)	foliar application with boom	0.04	600	0.24	2	85	0	0.010	0.050	0.060	< 0.01	< 0.01
							3	0.030	0.050	0.080	0.010	< 0.01
							7	0.020	0.050	0.070	0.010	< 0.01
							14	0.010	0.020	0.030	< 0.01	< 0.01
	foliar application with lance	0.04	600	0.24	2	84	0	0.120	0.100	0.22	< 0.01	< 0.01
							3	0.020	0.050	0.070	< 0.01	< 0.01
							7	0.030	0.070	0.10	< 0.01	< 0.01
							14	0.020	0.050	0.070	< 0.01	< 0.01

Table 76 Tomato Greenhouse Trials in European Union Member States in 2002 2003. Application of a 240 g as/L SC (E. Raunft, Report 2004/1010549; J. Wofford, Report 2004/5000469)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No and retreat-ment interval	Growth stage at last treat-ment BBCH		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2004/1010549 15324 Letschin/Wollup Germany (ACK/06/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	81	0	0.18	0.03	0.21	< 0.01	< 0.01
							3	0.16	0.04	0.20	< 0.01	< 0.01
							8	0.16	0.06	0.22	< 0.01	< 0.01
							14	0.09	0.04	0.13	< 0.01	< 0.01
		0.027	800	0.216			0	0.20	0.03	0.23	< 0.01	< 0.01
							3	0.13	0.03	0.16	< 0.01	< 0.01
							8	0.13	0.04	0.17	< 0.01	< 0.01
							14	0.11	0.05	0.16	< 0.01	< 0.01
#2004/1010549 5853 AB Siebengewald The Netherlands (AGR/10/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	86	0	0.32	0.09	0.41	< 0.01	< 0.01
							2	0.23	0.11	0.34	0.01	< 0.01
							7	0.23	0.13	0.36	0.02	< 0.01
							14	0.15	0.12	0.27	0.01	< 0.01
		0.027	800	0.216			0	0.25	0.08	0.33	< 0.01	< 0.01
							2	0.24	0.12	0.36	0.01	< 0.01
							7	0.15	0.10	0.36	0.01	< 0.01
							14	0.10	0.08	0.18	< 0.01	< 0.01
#2004/1010549 E-41720 Los Palacios Spain (ALO/08/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	78	0	0.05	0.03	0.08	< 0.01	< 0.01
							3	0.04	0.04	0.08	< 0.01	< 0.01
							7	0.03	0.05	0.08	< 0.01	< 0.01
							14	0.03	0.05	0.08	< 0.01	< 0.01
		0.027	800	0.216			0	0.05	0.03	0.08	< 0.01	< 0.01
							3	0.03	0.02	0.05	< 0.01	< 0.01
							7	0.04	0.05	0.09	< 0.01	< 0.01
							14	0.02	0.04	0.06	< 0.01	< 0.01
#2004/1010549 67203 Oberschaeffolsheim France (N) (FAN/07/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	86	0	0.13	0.05	0.18	< 0.01	< 0.01
							2	0.12	0.07	0.19	< 0.01	< 0.01
							8	0.09	0.06	0.15	0.01	< 0.01
							14	0.08	0.07	0.15	< 0.01	< 0.01
		0.027	800	0.216			0	0.10	0.03	0.13	< 0.01	< 0.01
							2	0.09	0.04	0.13	< 0.01	< 0.01
							8	0.07	0.05	0.12	< 0.01	< 0.01
							14	0.04	0.03	0.07	< 0.01	< 0.01
#2004/1010549 82170 Grisolle France (S) (FTL/06/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	85	0	0.08	0.06	0.14	< 0.01	< 0.01
							3	0.04	0.05	0.09	< 0.01	< 0.01
							7	0.03	0.05	0.08	< 0.01	< 0.01
							14	0.02	0.03	0.05	< 0.01	< 0.01
		0.027	800	0.216			0	0.05	0.04	0.09	< 0.01	< 0.01
							3	0.04	0.04	0.08	< 0.01	< 0.01
							7	0.04	0.07	0.11	< 0.01	< 0.01
							14	0.03	0.04	0.07	0.01	< 0.01
#2004/1010549 10026 Santena Italy (ITA/12/02)	foliar application/ 240 g as/L SC	0.033	800	0.264	2	81	0	0.09	0.04	0.13	< 0.01	< 0.01
							3	0.07	0.06	0.13	< 0.01	< 0.01
							7	0.04	0.03	0.07	< 0.01	< 0.01
							14	0.04	0.05	0.09	< 0.01	< 0.01
		0.027	800	0.216			0	0.10	0.05	0.15	< 0.01	< 0.01
							3	0.06	0.07	0.13	< 0.01	< 0.01
							7	0.04	0.04	0.08	< 0.01	< 0.01
							14	0.04	0.05	0.09	< 0.01	< 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method of treatment/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No and retreat-ment interval	Growth stage at last treat-ment BBCH		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2004/5000469 Limburg Netherlands (AGR/08/03)	foliar application/ 240 g as/L SC	0.033	800	0.264	2 RTI = 8d	88	0	0.25	0.09	0.34	< 0.01	< 0.01
							3	0.10	0.07	0.17	< 0.01	< 0.01
							7	0.10	0.07	0.17	< 0.01	< 0.01
							14	0.07	0.06	0.13	< 0.01	< 0.01
		0.027	800	0.216			0	0.28	0.10	0.36	< 0.01	< 0.01
							3	0.13	0.10	0.23	< 0.01	< 0.01
							7	0.13	0.12	0.25	< 0.01	< 0.01
							14	0.08	0.08	0.16	< 0.01	< 0.01
#2004/5000469 Andalucia Spain (S) (AYE/04/03)	foliar application/ 240 g as/L SC	0.033	800	0.264	2 RTI = 7d	74	0	0.06	0.05	0.11	< 0.01	< 0.01
							3	0.04	0.07	0.11	0.01	< 0.01
							7	0.02	0.06	0.08	< 0.01	< 0.01
							14	0.02	0.04	0.06	< 0.01	< 0.01
		0.027	800	0.216			0	0.05	0.04	0.09	< 0.01	< 0.01
							3	0.03	0.05	0.08	< 0.01	< 0.01
							7	0.02	0.05	0.07	< 0.01	< 0.01
							14	< 0.01	0.02	0.03	< 0.01	< 0.01
#2004/5000469 Alsace France (N) (FAN/08/03)	foliar application/ 240 g as/L SC	0.033	800	0.264	2 RTI = 7d	78	0	0.06	0.03	0.09	< 0.01	< 0.01
							3	0.05	0.03	0.08	< 0.01	< 0.01
							7	0.03	0.03	0.06	< 0.01	< 0.01
							13	0.03	0.03	0.06	< 0.01	< 0.01
		0.027	800	0.216	2 RTI = 7d		0	0.04	0.02	0.06	< 0.01	< 0.01
							3	0.07	0.03	0.10	< 0.01	< 0.01
							7	0.04	0.03	0.07	< 0.01	< 0.01
							13	0.02	0.02	0.04	< 0.01	< 0.01
#2004/5000469 Macedonia Greece (N) (GRE/05/03)	foliar application/ 240 g as/L SC	0.033	800	0.264	2 RTI = 7d	71	0	0.02	< 0.01	0.03	< 0.01	< 0.01
							3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							14	0.01	< 0.01	0.02	< 0.01	< 0.01
		0.027	800	0.216			0	0.01	< 0.01	0.02	< 0.01	< 0.01
							3	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							7	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							14	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Leafy Vegetables (Including Leafy Brassica Vegetables)

Chinese Cabbage

Table 77 Field Trials on Chinese Cabbage in Japan, Taiwan, and Korea. Application of a 25% (270 g as/L) or 20% or 22% SC (T. Yabusaki, 004, Report R-9008; T. Oumi, Report R-9006; H-J. Park H.-J., Report 2007/1060619; Anonymous, Report 2008/1052056)

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No. retreatment interval		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
R-9008 Iwate/Japan 2004	Foliar/ 270 g as/L SC	0.027	2700 3500 3500	0.729 0.945 0.945	3 RTI = 7d	1 3 7	0.96 1.88 0.85	1.47 3.36 1.44	2.4 3.2 2.3	< 0.05 0.20 0.10	< 0.05 < 0.05 < 0.05
R-9008 Iwate/Japan 2004	Foliar/ 270 g as/L SC	0.027	2500 2700 3500	0.675 0.729 0.945	3 RTI = 6 – 7d	14	0.33	0.46	0.76	< 0.05	< 0.05
R-9008 Ibaraki/Japan 2004	Foliar/ 270 g as/L SC	0.027	2000 2000 2000	0.540 0.540 0.540	3 RTI = 6 – 7d	1 3 7	1.04 0.96 0.28	1.37 1.60 0.41	2.4 2.6 0.69	< 0.05 0.07 < 0.05	< 0.05 0.06 < 0.05
R-9008 Ibaraki/Japan 2004	Foliar/ 270 g as/L SC SC	0.027	1500 2000 2000	0.405 0.540 0.540	3 RTI = 6-7d	14	< 0.05	< 0.05	< 0.10	< 0.05	< 0.05
R-9006 Iwate/Japan 2004	Foliar/ 270 g as/L SC	0.027	2700 3500 3500	0.729 0.945 0.945	3 RTI = 6-7d	1 3 7	0.57 1.20 0.81	0.83 1.71 1.30	1.4 2.9 2.1	0.06 0.58 0.12	< 0.05 < 0.05 < 0.05
R-9006 Iwate/Japan 2004	Foliar/ 270 g as/L SC	0.027	2500 2700 3500	0.675 0.729 0.945	3 RTI = 6-7d	14	0.31	0.46	0.77	< 0.05	< 0.05
R-9006 Ibaraki/Japan 2004	Foliar/ 270 g as/L SC	0.027	2000 2000 2000	0.540 0.540 0.540	3 RTI = 6-7d	1 3 7	0.89 0.45 0.21	1.11 0.64 0.19	2.0 1.1 0.40	0.38 0.30 < 0.05	< 0.05 < 0.05 < 0.05

Report No. Location (trial no.)	Application					PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No. retreatment interval		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
R-9006 Ibaraki/Japan 2004	Foliar/ 270 g as/L SC	0.027	1500 2000 2000	0.405 0.540 0.540	3 RTI = 7d	14	< 0.05	< 0.05	< 0.10	< 0.05	< 0.05
#2008/1052056 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A. Taichung Districted Agricultural Research Station Taichung, Taiwan R.O.C.	Foliar/ 240 g/L SC	1.34 L/ha	1000	0.320	3	0 3 6 9 11 14 18 21	4.4 3.6 2.4 1.3 1.4 1.6 1.6 0.37				
#2008/1052056 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A. Taichung Districted Agricultural Research Station Taichung, Taiwan R.O.C.	Foliar/ 240 g/L SC	1.0 L/ha	1000	0.240	3	0 3 6 9 11 14 18 21	3.9 3.5 2.1 1.3 1.4 1.3 1.4 1.1				
BASF DocID 2007/1060619 Trial No.: N.A. 254 Kumkok-ri, Dongtan-myun, Hwasung-shi, Kyunggido; Korea	Foliar/Glasshouse/ 20% SC	0.02	2000	0.4	2	3	1.04 0.91 0.88			0.04 < 0.01 < 0.01	-
BASF DocID 2007/1060619 Trial No.: N.A. 254 Kumkok-ri, Dongtan-myun, Hwasung-shi, Kyunggido; Korea	Foliar/Glasshouse/ 20% SC	0.02	2000	0.4	3	3 7 14	2.60 2.07 1.12			0.07 0.03 0.01	-

Lettuce

Table 78 Head Lettuce Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC (R. Leonard, Report 2003/5000346).

Report No. Location (trial no.)	Application					Growth stage at last treatment or date	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2002141 Kinston, NC/2002	broadcast/ postemergence/ 240 g as/L SC	0.090-0.107	279-327	0.29 - 0.3	4	80% of the expected head size reached	0 1 3 7 10	1.65, 1.30 2.12, 2.14 0.60, 0.95 0.66, 0.47 0.18, 0.19	2.32, 1.75 4.76, 4.84 1.37, 2.30 1.43, 0.98 0.34, 0.37	0.03, 0.03 0.06, 0.05 0.03, 0.04 0.04, 0.04 0.02, 0.02	0.02, 0.01 0.04, 0.04 0.01, 0.03 0.03, 0.02 < 0.01, < 0.01
#2003/5000346 RCN 2002142 Winter Haven, FL/2002	broadcast/ postemergence	0.104	279-284	0.29	4	80% of the expected head size reached	0 1 3 7 10	1.73, 1.20 0.67, 0.71 0.56, 0.81 0.36, 0.43 0.19, 0.28	2.42, 1.83 1.65, 1.85 1.34, 1.95 0.83, 0.97 0.44, 0.65	0.03, 0.03 0.03, 0.04 0.05, 0.04 0.03, 0.03 0.02, 0.02	0.02, 0.02 0.02, 0.02 0.02, 0.04 0.03, 0.03 0.02, 0.02
#2003/5000346 RCN 2002143 Glenn, CA/2002	broadcast/ postemergence/ 240 g as/L SC	0.09-0.103	281-329	0.29	4	typ. Size, form and firmness of heads reached	0 1 3 7 10	0.11, 0.07 0.10, 0.08 0.12, 0.06 0.04, 0.02 0.03, 0.03	0.06, 0.03 0.14, 0.09 0.19, 0.06 0.05, 0.03 0.04, 0.05	< 0.01, < 0.01 < 0.01, < 0.01 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000346 RCN 2003104 Madera, CA/2003	broadcast/ postemergence/ 240 g as/L SC	0.103-0.104	278-285	0.29	4	80% of the expected head size reached	0 1 3 7 10	2.50, 1.85 1.02, 1.34 0.73, 1.03 0.41, 0.43 0.40, 0.37	1.91, 1.45 2.30, 3.10 1.72, 2.48 0.95, 1.02 0.90, 0.86	0.04, 0.03 0.07, 0.09 0.07, 0.11 0.05, 0.05 0.05, 0.05	0.02, 0.01 0.04, 0.02 0.02, 0.03 0.02, 0.02 0.02, 0.02
#2003/5000346 RCN 2003105 Salinas, CA/2003	broadcast/ postemergence/ 240 g as/L SC	0.123-0.125	234-236	0.29	4	20% of the expected head size reached	0 1 3 7 10	6.80, 8.08 0.33, 0.23 0.96, 1.05 0.46, 0.07 0.03, 0.06	2.14, 2.60 0.81, 0.54 1.18, 1.27 0.31, 0.05 0.02, 0.05	0.04, 0.05 0.03, 0.02 0.03, 0.03 0.02, < 0.01 < 0.01, < 0.01	0.02, 0.02 0.02, 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application					Growth stage at last treatment or date	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2003147 San Ardo, CA/2003	broadcast/ postemergence/ 240 g as/L SC	0.102-0.103	282-290	0.29 - 0.3	4	9 or more true leaves unfolded	0 1 3 7 10	0.26, 0.14 0.10, 0.15 0.08, 0.13 0.04, 0.08 0.02, 0.07	0.26, 0.15 0.22, 0.32 0.18, 0.26 0.08, 0.18 0.05, 0.13	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Table 79 Head Lettuce Field Trials in European Union Member States in 2004 – 2005. Application of a 240 g as/L SC (H. Schulz, Report 2005/1004982; N. Reichert, 2005/1032964).

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2005/1004982 6595 MS Ottersum Zandsteeg 18 Limburg Netherland (AGR/29/04)	Knapsack boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	2.39 0.75 0.15 < 0.01	1.39 1.25 0.25 < 0.01	3.8 2.0 0.40 < 0.02	0.02 0.03 0.02 < 0.01	< 0.01 0.01 < 0.01 < 0.01
#2005/1004982 Finca la Deshesilla s/n E-41710 Utrera Andalucia Spain (ALO/38/04)	Schachtner boom sprayer	0.060	400	0.240	2	BBCH 47	0 3 7 14	1.19 0.28 0.06 0.03	1.12 0.48 0.09 0.05	2.3 0.76 0.15 0.08	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1004982 Wiesenäcker 44 D-69121 Handschuhsheim Baden-Wurttemberg Germany (DU2/14/04)	Gloria boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	2.32 0.74 0.38 0.10	1.80 1.25 0.69 0.17	4.1 2.0 1.1 0.27	0.03 0.04 0.02 < 0.01	0.02 0.02 0.02 < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2005/1004982 Auf der Brache 4 D-67245 Lambsheim Rhineland Palatinate Germany (DU4/15/04)	Gloria boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	1.44 0.64 0.30 0.07	0.77 1.05 0.51 0.13	2.2 1.7 0.81 0.20	0.02 0.05 0.03 < 0.01	0.01 0.02 0.01 < 0.01
#2005/1004982 17 rue du notariat F-67203 Oberschaeffolsheim Alsace North France (FAN23/04)	ATH boom sprayer	0.060	400	0.240	2	BBCH 44	0 3 7 15	2.84 0.77 0.46 0.11	2.51 1.27 0.75 0.20	5.4 2.0 1.2 0.31	0.01 0.04 0.03 < 0.01	0.01 0.02 0.02 < 0.01
2005/1004982 route de Chatillon F-26750 St-Paul les Romans Rhone-Alpes South France (FBD/24/04)	ATH boom sprayer	0.060	400	0.240	2	BBCH 48	0 2 7 13	1.63 1.42 0.62 0.31	1.95 2.19 0.99 0.52	3.6 3.6 1.6 0.83	0.03 0.09 0.07 0.03	0.02 0.02 0.03 0.02
#2005/1004982 24, Route Neuve St Caprais F-31330 Grenade sur Garonne Midi-Pyrenees South France (FTL/26/04)	ATH boom sprayer	0.060	400	0.240	2	BBCH 49	0 2 6 13	3.86 1.16 0.57 0.28	1.48 1.79 0.95 0.46	5.3 3.0 1.5 0.74	0.03 0.04 0.04 0.03	0.01 0.02 0.02 0.01
2005/1004962 N. Chalkidona GR-57007 N. Chalkidona Macedonia Greece (GRE/25/04)	boom sprayer	0.060	400	0.240	2	BBCH 47	0 2 7 13	2.79 1.85 1.84 0.54	0.83 1.00 0.55 0.54	3.6 2.8 2.4 1.1	0.01 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2005/1032964 5500 Midelfart Røjleskovvej 18 Fuenen Denmark (ALB/03/05)	Knapsack boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	0.83 0.46 0.19 0.12	0.89 0.73 0.24 0.14	1.7 1.2 0.44 0.26	0.03 0.04 0.01 < 0.01	< 0.01 0.02 < 0.01 < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
2005/1032964 Finca la Deshesilla 41710 Utrera Andalucia Spain (ALO/08/05)	Schachtner boom sprayer	0.060	400	0.240	2	BBCH 45	0 3 7 14	1.31 0.71 0.41 0.12	2.13 1.13 0.76 0.23	3.4 1.8 1.2 0.35	0.01 0.03 0.02 < 0.01	0.02 0.02 0.02 < 0.01
#2005/1032964 67245 Lambsheim Auf der Brache 4 Rheinland-Pfalz Germany (DU4/03/05)	Gloria boom sprayer	0.060	400	0.2400	2	BBCH 47	0 3 7 14	5.44 0.51 0.20 0.02	3.51 0.97 0.37 0.04	9.0 1.5 0.57 0.06	0.01 0.01 < 0.01 < 0.01	0.02 < 0.01 < 0.01 < 0.01
#2005/1032964 17 rue du notariat F-67203 Oberschaeffolsheim Alsace North France (FAN/05/05)	ATH boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	1.22 0.36 0.22 0.08	1.22 0.66 0.48 0.12	2.4 1.0 0.70 0.20	0.01 0.01 0.01 < 0.01	0.01 < 0.01 0.01 < 0.01
#2005/1032964 72800 Thorée les pins, La Belle Métairie, Pays de la Loire North France (FBM/03/05)	boom sprayer	0.060	400	0.240	2	BBCH 48	0 3 7 14	1.84 0.52 0.39 0.02	0.81 0.91 0.73 0.05	2.6 1.4 1.1 0.07	0.01 0.02 0.02 < 0.01	< 0.01 < 0.01 0.01 < 0.01
#2005/1032964 31330 Grenade Sur Garone, 24 , Route Neuve St Caprais Midi-Pyrenees South France (FTL/04/05)	ATH boom sprayer	0.060	400	0.240	2	BBCH 48	0 2 7 14	2.13 0.97 0.57 0.32	1.50 2.01 0.99 0.62	3.6 3.0 1.6 0.94	0.02 0.04 0.04 0.03	0.02 0.02 0.03 0.02
#2005/1032964 57007 Thessaloniki, Nea Chalkidona Macedonia Greece (GRE/06/05)	boom sprayer	0.060	400	0.240	2	BBCH 45	0 4 8 14	4.26 1.94 1.20 0.83	2.23 3.04 1.94 1.38	6.6 5.0 3.1 2.2	0.03 0.10 0.07 0.06	0.02 0.03 0.03 0.03
#2005/1032964 Via Orba 2, 15072 Casalcermelli, Piemonte Italy (ITA/08/05)	Euro-Pulve boom sprayer	0.060	400	0.240	2	BBCH 45	0 3 7 14	3.40 0.92 0.31 0.10	3.71 1.76 0.63 0.18	7.1 2.7 0.94 0.28	0.02 0.06 0.01 < 0.01	0.01 0.02 0.01 < 0.01

Table 80 Head Lettuce Glasshouse Trials in European Union Member States in 2007. Application of a 240 g as/L SC (E. Schroth, Report 2008/1032734)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treat-ments	Growth stage at last treat-ment or date		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2008/1032734 D-47652 Weeze North Rhine Westphalia, Germany (L070154)	foliar application with boom	0.08	300	0.24	2	48	0 1 3 7	1.6 1.7 1.9 1.3	0.6 0.9 1.2 1.1	2.2 2.6 3.1 2.4	< 0.01 0.01 0.01 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1032734 F-49130 St. Gemmes sur Loire Maine-et-Loire, France (L070155)	foliar application with boom	0.08	300	0.24	2	48	0 1 3 7	3.0 2.5 3.0 2.0	1.0 1.2 1.4 1.5	4.0 3.7 4.4 3.5	< 0.01 < 0.01 < 0.01 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1032734 5853 AB Siebengewald Limburg, The Netherlands (L070156)	foliar application with boom	0.08	300	0.24	2	48	0 1 3 7	3.2 1.8 1.2 0.9	1.1 0.8 0.8 0.8	4.3 2.6 2.0 1.7	0.01 0.01 0.01 .01	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1032734 3454 Rummen Brabant, Belgium (L070157)	foliar application with boom	0.08	300	0.24	2	47	0 1 3 7	2.6 2.3 1.5 0.6	1.2 2.0 0.9 0.4	3.8 4.3 2.4 1.0	0.01 0.02 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1032734 I-64011 Alba Adriatica Teramo, Italy (L070158)	foliar application with boom	0.08	300	0.24	2	41	0 1 3 7	4.2 2.4 1.9 1.4	3.2 3.2 3.6 2.8	7.4 5.6 5.5 4.2	0.02 0.02 0.03 0.02	< 0.01 < 0.01 < 0.01 < 0.01
#2008/1032734 F-30100 Alés Gard, France (L070159)	foliar application with boom	0.08	300	0.24	2	46	0 1 3 7	4.3 2.9 2.2 1.2	3.5 4.6 4.2 2.9	7.8 7.5 6.4 4.1	0.06 0.09 0.09 0.04	0.02 0.02 0.02 0.01
#2008/1032734 GR-57200 Profitis Thessaloniki, Greece (L070160)	foliar application with boom	0.08	300	0.24	2	47	0 1 3 7	3.6 1.9 1.6 1.0	2.9 3.8 3.4 2.6	6.5 5.7 5.0 3.6	0.03 0.03 0.03 0.04	0.02 0.01 0.02 0.02
#2008/1032734 E-41710 Utrera Sevilla, Spain (L070161)	foliar application with boom	0.08	300	0.24	2	47	0 1 3 7	7.8 3.1 2.7 2.6	3.7 3.9 1.9 2.1	12 7.0 4.6 4.7	0.01 < 0.01 < 0.01 0.01	0.01 0.01 < 0.01 < 0.01

Table 81 Leaf Lettuce Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC formulation (R. Leonard, Report 2003/5000346)

Report No. Location (trial no.)	Application					Growth stage at last treat-ment	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2002144 Oglethorpe, GA/2002	broadcast/ postemergence/ 240 g as/L SC	0.101-0.106	274-290	0.29-0.30	4	Harvest. Vege-tative plant parts have final size	0	9.12, 9.04	14.10, 14.50	0.32, 0.28	0.23, 0.24
							1	8.16, 6.73	17.40, 14.20	0.61, 0.54	0.33, 0.27
							3	5.49, 4.22	11.30, 8.80	0.34, 0.39	0.26, 0.20
							7	5.68, 4.42	11.40, 8.56	0.76, 0.65	0.42, 0.35
							10	3.59, 5.82	7.22, 11.80	0.54, 0.91	0.24, 0.41
#2003/5000346 RCN 2002145 Oviedo, FL/2002	broadcast/ postemergence/ 240 g as/L SC	0.103	270-281	0.28 - 0.29	4	Harvest. Vege-tative plant parts have final size	0	3.27, 3.20	3.92, 4.24	0.06, 0.07	0.03, 0.03
							1	2.01, 1.81	3.64, 3.30	0.10, 0.10	0.04, 0.03
							3	1.02, 1.57	1.98, 3.10	0.08, 0.12	0.03, 0.05
							7	0.87, 0.74	1.67, 1.39	0.09, 0.09	0.05, 0.04
							10	0.75, 0.56	1.40, 0.97	0.10, 0.07	0.05, 0.04
#2003/5000346 RCN 2002146 Porterville, CA/2002	broadcast/ postemergence/ 240 g as/L SC	0.100-0.104	279-302	0.29-0.30	4	9 or more side sheets visible	0	4.40, 5.44	4.52, 6.72	0.04, 0.06	0.02, 0.03
							1	4.04, 3.26	7.80, 6.24	0.08, 0.05	0.04, 0.02
							3	2.15, 2.02	4.80, 4.40	0.07, 0.06	0.02, 0.02
							7	1.35, 1.30	3.24, 3.13	0.06, 0.06	0.03, 0.03
							10	0.69, 0.86	1.63, 2.08	0.04, 0.04	0.02, 0.02
#2003/5000346 RCN 2003101 Fresno, CA/2003	broadcast/ postemergence/ 240 g as/L SC	0.103-0.104	276-285	0.29-0.30	4	Harvest. Vege-tative plant parts 70% of final size	0	2.64, 2.92	6.76, 6.16	0.15, 0.10	0.06, 0.04
							1	2.62, 2.23	5.48, 4.92	0.12, 0.12	0.06, 0.06
							3	1.34, 1.44	3.04, 3.28	0.07, 0.08	0.04, 0.05
							7	0.03, 0.16	0.04, 0.35	< 0.01, < 0.01	< 0.01, < 0.01
							10	0.55, 0.71	1.21, 1.68	0.03, 0.03	0.04, 0.06
#2003/5000346 RCN 2003140 Madera, CA/2003	broadcast/ postemergence	0.103-0.104	282-284	0.29	4	6 side sheets visible	0	6.40, 7.48	9.76, 10.32	0.23, 0.24	0.12, 0.13
							1	4.56, 5.04	9.64, 11.28	0.23, 0.28	0.11, 0.14
							3	4.16, 3.18	9.52, 7.48	0.34, 0.26	0.18, 0.13
							7	1.52, 1.47	3.33, 3.42	0.12, 0.14	0.07, 0.08
							10	1.22, 0.67	2.92, 1.48	0.10, 0.04	0.09, 0.04

Report No. Location (trial no.)	Application					Growth stage at last treat-ment	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2003103 San Ardo, CA/2003	broadcast/ postemergence	0.101-0.103	283-300	0.29 - 0.3	4	fully ripe	0	2.32, 2.44	1.54, 1.62	0.02, 0.02	< 0.01, 0.01
							1	1.03, 1.06	2.12, 2.31	0.02, 0.01	0.01, < 0.01
							3	0.85, 0.78	1.88, 1.77	0.02, 0.02	0.01, 0.02
							7	0.23, 0.19	0.52, 0.46	< 0.01, < 0.01	< 0.01, < 0.01
							10	0.23, 0.17	0.50, 0.37	0.01, 0.01	0.01, 0.01

Mustard greens

Table 82 Mustard Greens field trials in the USA in 2002 – 2003. Application of a 240 g as/L SC (R. Leonard, Report 2003/5000347)

Report No. Location (trial no.)	Application						PHI days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments and retreat-ment interval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2002159 Newport, AR/2002	broadcast/ postemergence	0.126	231-232	0.29	4 RTI=7d	8th true leaf unfolded	0	2.69, 2.84	4.72, 4.72	0.06, 0.07	0.02, 0.02
							1	0.88, 1.42	1.72, 2.32	0.05, 0.06	0.02, 0.02
							3	0.60, 0.50	1.10, 1.11	0.04, 0.04	0.02, 0.02
							7	0.34, 0.42	0.71, 0.89	0.04, 0.05	< 0.01, 0.01
							10	0.13, 0.13	0.21, 0.23	0.02, 0.01	< 0.01, < 0.01
#2003/5000347 RCN 2002160 Coplony, OK/2002	broadcast/ postemergence	0.131-0.138	211-222	0.29	4 RTI=7-8d	9 or more true leaves unfolded	0	8.05, 7.67	16.31, 19.76	0.37, 0.39	0.09, 0.09
							1	6.08, 6.08	16.08, 15.55	0.32, 0.39	0.11, 0.09
							3	6.11, 4.80	10.64, 9.12	0.32, 0.26	0.08, 0.08
							8	1.14, 1.09	2.14, 2.24	0.26, 0.23	0.07, 0.07
							11	0.55, 0.50	1.07, 0.96	0.16, 0.14	0.04, 0.04
#2003/5000347 RCN 2002161 Porterville, CA/2002	broadcast/ postemergence	0.092-0.101	289-317	0.29	4 RTI=7d	9 or more true leaves unfolded	0	3.12, 2.55	4.64, 4.24	0.05, 0.04	0.03, 0.03
							1	3.26, 1.56	5.52, 3.57	0.06, 0.05	0.03, 0.03
							3	1.97, 1.70	4.24, 3.97	0.06, 0.06	0.03, 0.04
							7	1.01, 1.36	2.59, 3.02	0.05, 0.05	0.03, 0.04
							10	0.83, 1.14	2.16, 2.78	0.04, 0.06	0.02, 0.03

Report No. Location (trial no.)	Application						PHI days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments and retreat-ment interval	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000347 RCN 2003119 Chula, GA/2003	broadcast/ postemergence	0.084-0.134	218-347	0.28 - 0.29	4 RTI=7d	9 or more true leaves unfolded	0	9.08, 9.32	3.80, 4.04	0.06, 0.07	0.03, 0.04
							1	5.32, 5.48	7.32, 7.48	0.07, 0.08	0.04, 0.04
							3	2.79, 2.23	5.68, 4.48	0.09, 0.07	0.03, 0.02
							7	1.06, 1.02	2.29, 2.29	0.06, 0.06	0.03, 0.03
							10	0.54, 0.33	0.93, 0.65	0.04, 0.03	0.02, 0.01
#2003/5000347 RCN 2003120 Arkansaw, WI/2003	broadcast/ postemergence	0.103-0.106	279-285	0.29 -0.3	4 RTI=7d	9 or more true leaves unfolded	0	8.80, 9.08	24.24, 25.00	0.17, 0.20	0.03, 0.04
							1	5.88, 4.56	15.16, 11.72	0.18, 0.15	0.04, 0.03
							3	1.86, 2.09	5.40, 6.08	0.14, 0.15	0.06, 0.06
							7	0.37, 0.42	0.88, 1.00	0.02, 0.02	0.02, 0.02
							10	0.16, 0.09	0.35, 0.20	< 0.01, < 0.01	0.01, < 0.01

Spinach

Table 83 Spinach Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC (R. Leonard, Report 2003/5000346)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2002150 Delta, CO/2002	broadcast/ postemer-gence/ 240 g as/L SC	0.104	272-285	0.28 - 0.30	4	Vege-tative plant parts have final size	0	7.72, 9.68	14.40, 20.60	0.06, 0.08	0.05, 0.07
							1	4.56, 4.44	10.00, 9.24	0.05, 0.04	0.05, 0.07
							3	8.16, 5.36	18.50, 11.36	0.06, 0.05	0.09, 0.09
							7	1.60, 1.90	3.56, 4.00	0.02, 0.03	0.04, 0.05
							10	1.02, 0.86	1.95, 1.62	0.01, 0.02	0.03, 0.03

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2002151 Glenn, CA/2002	broadcast/ postemer-gence/ 240 g as/L Sc	0.088-0.105	282-331	0.29	4	stem (rosette) 70% of final length (diameter)	0 1 3 7 10	17.50, 16.40 9.12, 7.93 7.38, 8.64 4.84, 5.92 6.52, 3.61	11.50, 10.80 16.20, 14.20 14.20, 16.70 9.20, 10.60 12.00, 6.52	0.11, 0.09 0.13, 0.10 0.11, 0.14 0.12, 0.17 0.11, 0.07	0.15, 0.14 0.20, 0.17 0.19, 0.23 0.18, 0.23 0.25, 0.13
#2003/5000346 RCN 2002152 Hickman, CA/2002	broadcast/ postemer-gence/ 240 g/L SC	0.104	281-284	0.29-0.30	4	Harvest. Vege-tative plant parts 50% of final size	0 1 3 7 10	8.76, 8.72 7.72, 7.88 3.71, 6.72 3.08, 3.52 2.42, 3.32	11.40, 12.00 12.80, 13.00 6.60, 11.40 5.52, 6.52 4.52, 5.80	0.09, 0.06 0.08, 0.11 0.07, 0.09 0.08, 0.06 0.06, 0.06	0.09, 0.10 0.13, 0.12 0.06, 0.12 0.07, 0.09 0.06, 0.08
#2003/5000346 RCN 2003110 Chula, GA/2003	broadcast/ postemer-gence/ 240g as/L SC	0.085-0.092	319-344	0.29	4	9 or more true leaves, leaf pairs, whorls unfolded	0 1 3 7 10	6.40, 6.40 5.64, 4.68 2.31, 2.33 1.01, 1.00 0.29, 0.41	14.96, 15.26 14.98, 11.46 6.04, 6.12 2.62, 2.56 0.71, 1.06	0.06, 0.07 0.18, 0.10 0.22, 0.18 0.06, 0.06 < 0.01, 0.01	0.08, 0.09 0.09, 0.08 0.12, 0.12 0.09, 0.10 0.04, 0.05
#2003/5000346 RCN 2003111 Germansville, PA	broadcast/ postemer-gence/ 240 g as/L SC	0.104-0.105	276-288	0.29 - 0.3	4	Harvest. Vege-tative plant parts 50% of final size	0 1 3 7 10	8.44, 7.12 5.96, 6.08 3.12, 4.44 1.43, 1.54 0.47, 0.47	17.30, 14.84 14.66, 13.74 7.20, 10.70 3.14, 3.20 0.96, 0.96	0.12, 0.14 0.12, 0.12 0.12, 0.13 0.04, 0.05 0.03, 0.03	0.09, 0.09 0.11, 0.10 0.14, 0.17 0.12, 0.13 0.05, 0.06
#2003/5000346 RCN 2003112 Uvalde, TX/2003	broadcast/ postemer-gence/ 240 g as/L SC	0.121-0.134	220-243	0.28 - 0.3	4 March 31th, 2003	Harvest. Vegetative plant parts 50% of final size	0 1 3 7 10	8.08, 9.16 7.52, 9.84 3.22, 3.15 1.24, 1.15 0.99, 1.15	18.82, 21.00 17.22, 18.48 7.80, 7.60 2.96, 2.68 2.20, 2.46	0.43, 0.46 0.46, 0.48 0.23, 0.21 0.04, 0.04 0.06, 0.05	0.20, 0.20 0.21, 0.24 0.19, 0.17 0.08, 0.08 0.07, 0.07

Legume vegetables

Soya bean (immature with pod)

Table 84 Soya bean (Immature with Pod) Field Trials in Taiwan in 2007. Application of a 240 g as/L SC (22%) formulation (Anonymous, Report 2008/1052055).

Report No. Location (trial no.)	Application			No. of treatments	PHI (days)	Residues (mg/kg) Metaflumizone + M320I04 + M320I23
	Method/ Formulation	Water L/ha	kg as/ha			
#2008/1052055 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A. Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI) Yuenlin, Taiwan R.O.C.	Spray/ 240 g as/L SC	1000	0.320	3	0 3 6 9 12 15 18 21	0.91 0.77 0.73 0.73 -- 0.45 0.17 0.16
#2008/1052055 46th consultative conference of committee for pesticide registration in Taiwan , Trial No.: N.A. Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI) Yuenlin, Taiwan R.O.C.	Spray/ 240 g as/L SC	1000	0.240	3	0 3 6 9 12 15 18 21	0.84 0.70 0.65 0.68 0.56 0.30 0.20 0.19

Root and Tuber Vegetables

Potato

Table 85 Potato Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC formulation (R. Johnston, Report 2003/5000537)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method and Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000537 RCN 2002113 Hereford, PA/2002	Broadcast Foliar/ 240 g as/L SC	0.089-0.096	309-333	0.3-0.31	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002114 North Rose, NY/2002	Broadcast Foliar/ 240 g as/L SC 1	0.13	217-226	0.29-0.3	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method and Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000537 RCN 2002115 Chula, GA/2002	Broadcast Foliar/ 240 g as/L SC	0.086-0.098	296-347	0.29-0.3	4 RTI=7-8d	60% of total final tuber mass reached	1 3 7 14 21	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000537 RCN 2002116 Bunnell, FL/2002	Broadcast Foliar/ 240 g as/L SC	0.101-0.114	254-293	0.29	4 RTI=6-7d	70% of total final tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002117 Arkansaw, WI/2002	Broadcast Foliar/ 240 g as/L SC	0.155-0.156	187-190	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002118 Britton, SD/2002	Broadcast Foliar/ 240 g as/L SC	0.125	233-236	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000308 #2003/5000537 RCN 2002119 Theilman, MN/2002	Broadcast Foliar/ 240 g as/L SC	0.159	188-189	0.3	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002120 Gardner, ND/2002	Broadcast Foliar/ 240 g as/L SC	0.104	281-284	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002121 Center, CO/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.106	277-291	0.28-0.3	4 RTI=7d	50% of the leaves brownish	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002122 Porterville, CA/2002	Broadcast Foliar/ 240 g as/L SC	0.107	276-285	0.29-0.3	4 RTI=6-8d	tubers formed	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002123 Jerome, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.118-0.125	234-247	0.29-0.31	4 RTI=7-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002124 Jerome, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.122-0.125	236-241	0.29-0.3	4 RTI=6-8d	70% of total final tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method and Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000308 #2003/5000537 RCN 2002125 Payette, ID/2002	Broadcast Foliar	0.155	188-194	0.29-0.3	4 RTI=6-7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002126 Payette, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.155-0.156	184-185	0.28-0.29	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002127 Ephrata, WA/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.104	282-287	0.29	4 RTI=7d	beginning of leaf yellowing	1 3 7 14 21	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000537 RCN 2002128 Ephrata, WA/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.104	281-288	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/1001353 CV23 0JT Rugby UK (OAT/14/02)	medium volume foliar application / 240 g as/L SC	0.017	300	0.050	3	89	0 6 13 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/5000537 RCN 2002113 Hereford, PA/2002	Broadcast Foliar/ 240 g as/L SC	0.089-0.096	309-333	0.3-0.31	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002114 North Rose, NY/2002	Broadcast Foliar/ 240 g as/L SC	0.13	217-226	0.29-0.3	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002115 Chula, GA/2002	Broadcast Foliar/ 240 g as/L SC	0.086-0.098	296-347	0.29-0.3	4 RTI=7-8d	60% of total final tuber mass reached	1 3 7 14 21	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
#2003/5000537 RCN 2002116 Bunnell, FL/2002	Broadcast Foliar/ 240 g as/L SC	0.101-0.114	254-293	0.29	4 RTI=6-7d	70% of total final tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method and Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000537 RCN 2002117 Arkansaw, WI/2002	Broadcast Foliar/ 240 g as/L SC	0.155-0.156	187-190	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002118 Britton, SD/2002	Broadcast Foliar/ 240 g as/L SC	0.125	233-236	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000308 #2003/5000537 RCN 2002119 Theilman, MN/2002	Broadcast Foliar/ 240 g as/L SC	0.159	188-189	0.3	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002120 Gardner, ND/2002	Broadcast Foliar/ 240 g as/L SC	0.104	281-284	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002121 Center, CO/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.106	277-291	0.28-0.3	4 RTI=7d	50% of the leaves brownish	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002122 Porterville, CA/2002	Broadcast Foliar/ 240 g as/L SC	0.107	276-285	0.29-0.3	4 RTI=6-8d	tubers formed	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002123 Jerome, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.118-0.125	234-247	0.29-0.31	4 RTI=7-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002124 Jerome, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.122-0.125	236-241	0.29-0.3	4 RTI=6-8d	70% of total final tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000308 #2003/5000537 RCN 2002125 Payette, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.155	188-194	0.29-0.3	4 RTI=6-7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002126 Payette, ID/2002	Broadcast Foliar/ 240 g as/L SC	0.155-0.156	184-185	0.28-0.29	4 RTI=6-8d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2003/5000537 RCN 2002127 Ephrata, WA/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.104	282-287	0.29	4 RTI=7d	beginning of leaf yellowing	1 3 7 14 21	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)			
	Method and Formu-lation	kg as/hL	Water L/ha	kg as/ha	No of treatments	Growth stage at last treat-ment		BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000537 RCN 2002128 Ephrata, WA/2002	Broadcast Foliar/ 240 g as/L SC	0.102-0.104	281-288	0.29	4 RTI=7d	maximum of total tuber mass reached	7	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Table 86 Potato Field Trials in Member States of the European Union in 2002. Application of a 240 g as/L SC formulation (E. Raunft, Report 2003/1001353)

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lationt	kg as/hL	Water L/ha	kg as/ha	No. of treat-ments	Growth stage at last treat-ment (BBCH)		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001353 CV23 0JT Rugby UK (OAT/14/02)	medium volume foliar application/ 240 g as/L SC	0.033	300	0.100	3	89	0 6 13 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 6595 MS Ottersum The Netherlands (AGR/12/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	47	0 6 13 20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 E-41808 Villanueva del Ariscal, Spain (ALO/13/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	45	0 7 13 20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 41720 Los Palacios Villafranca (Sevilla) Spain (AYE/09/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	49	0 7 14 20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 74193 Stetten a.H. Germany (DU2/10/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	47	0 7 14 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Report No. Location (trial no.)	Application						PHI (days)	Residues (mg/kg)				
	Method/ Formu-lationt	kg as/hL	Water L/ha	kg as/ha	No. of treat-ments	Growth stage at last treat-ment (BBCH)		BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I04	M320I23
#2003/1001353 67245 Lambsheim Germany (DU4/11/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	48	0 7 13 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 67117 Handschuheim Alsace, France (N) (FAN/08/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	47	0 7 14 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 26750 St-Paul les Romans, France (S) (FBD/08/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	79	0 6 14 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 31330 Ondes France (S) (FLT/09/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	48	0 7 14 20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 15053 Castelnuovo Scrivia, Italy (ITA/16/02)	medium medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	89	0 7 13 20	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01
#2003/1001353 CV23 0JT Rugby UK (OAT/14/02)	medium volume foliar application/ 240 g as/L SC	0.017	300	0.050	3	89	0 6 13 21	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01	< 0.02 < 0.02 < 0.02 < 0.02	< 0.01 < 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01 < 0.01

Stalk and Stem Vegetables

Celery

Table 87 Celery Field Trials in the USA in 2002 and 2003. Application of a 240 g as/L SC (R. Leonard, Report 2003/5000346)

Report No. Location (trial no.)	Application						Portion analysed	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No. of treat-ments and retreatment interval	Growth stage at last treatment or date Growth stage at last treatment or date			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2002147 Hobe Sound, FL/2002	broadcast/ post-emergence/ 240 g as/L SC	0.124-0.130	220-235	0.29	4 RTI = 6 – 7 d	9 or more true leaves unfolded	untrimmed leaf stalk	0 1 3 7 10	2.68, 2.37 1.74, 1.38 0.59, 0.72 0.30, 0.19 0.17, 0.09	3.93, 4.56 3.30, 2.75 1.13, 1.42 0.52, 0.36 0.33, 0.15	0.03, 0.03 0.03, 0.02 0.02, 0.02 0.01, < 0.01 < 0.01, < 0.01	0.02, 0.03 0.02, 0.03 0.02, 0.02 0.01, < 0.01 < 0.01, < 0.01
#2003/5000346 RCN 2002148 Arkansaw, WI/2002	broadcast/ post-emergence/ 240 g as/L SC	0.156-0.160	185-188	0.29 - 0.3	4 RTI = 6 – 7 d	9 or more true leaves unfolded	untrimmed leaf stalk	0 1 3 7 10	2.54, 3.09 2.37, 2.52 2.04, 1.67 0.79, 0.77 0.69, 0.65	4.20, 4.96 5.40, 5.68 5.08, 4.24 2.10, 1.83 1.52, 1.47	0.04, 0.04 0.06, 0.06 0.07, 0.07 0.06, 0.05 0.04, 0.04	0.12, 0.15 0.15, 0.16 0.23, 0.18 0.18, 0.16 0.15, 0.17
#2003/5000346 RCN 2002149 Fresno, CA/2002	broadcast/ post-emergence/ 240 g as/L SC	0.102	277-284	0.28 - 0.29	4 RTI = 6 – 78 d	20% have reached typical size	untrimmed leaf stalk	0 1 3 7 10	5.28, 4.44 2.97, 3.34 2.65, 3.19 3.27, 3.07 2.22, 1.49	8.56, 6.88 6.52, 6.28 5.76, 5.52 7.12, 6.68 4.60, 2.92	0.10, 0.09 0.11, 0.08 0.09, 0.11 0.13, 0.12 0.09, 0.07	0.05, 0.04 0.05, 0.03 0.04, 0.04 0.07, 0.06 0.05, 0.04
#2003/5000346 RCN 2003107 King City, CA/2003	broadcast/ post-emergence/ 240 g as/L SC	0.102-0.103	282-291	0.29 - 0.3	4 RTI = 6 – 7 d		untrimmed leaf stalk	0 1 3 7 10	1.57, 1.73 0.75, 0.59 0.47, 0.55 0.12, 0.13 0.13, 0.07	0.73, 0.90 1.61, 1.31 0.94, 1.03 0.24, 0.25 0.21, 0.12	< 0.01, 0.01 0.02, 0.01 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, 0.01 0.01, 0.01 0.01, 0.01 < 0.01, < 0.01 < 0.01, < 0.01

Report No. Location (trial no.)	Application						Portion analysed	PHI (days)	Residues (mg/kg)			
	Method/ Formu-lation	kg as/hL	Water L/ha	kg as/ha	No. of treat-ments and retreatment interval	Growth stage at last treatment or date Growth stage at last treatment or date			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2003/5000346 RCN 2003108 Madera, CA/2003	broadcast/ post emergence/ 240 g as/L SC	0.104	277-284	0.29	4 RAI = 6 – 7 d	Harvest. Vegetative plant parts 70% of final size	untrimmed leaf stalk	0	4.48, 3.40	5.80, 4.88	0.08, 0.08	0.15, 0.14
								1	3.21, 2.54	6.84, 5.76	0.11, 0.10	0.18, 0.15
								3	2.24, 2.40	5.52, 5.88	0.11, 0.09	0.20, 0.23
								7	1.44, 1.53	3.62, 3.86	0.08, 0.08	0.21, 0.22
								10	1.11, 1.05	2.62, 2.50	0.05, 0.06	0.20, 0.20
#2003/5000346 RCN 2003109 Fresno, CA/2003	broadcast/ post-emergence/ 240 g as/L SC	0.102-0.104	277-285	0.29	4 RTI = 6 – 7 d	Harvest. Vegetative plant parts 70% of final size	untrimmed leaf stalk	0	2.82, 3.01	4.84, 5.40	0.10, 0.10	0.08, 0.07
								1	2.72, 2.12	5.52, 4.24	0.11, 0.11	0.10, 0.08
								3	1.64, 1.54	3.55, 3.49	0.11, 0.12	0.09, 0.11
								7	1.43, 1.36	3.37, 3.24	0.14, 0.11	0.13, 0.11
								10	0.66, 0.81	1.67, 1.88	0.09, 0.12	0.08, 0.10

Nuts and Seeds

Almonds

Table 88 Almond Field Trials in the USA in 2006. Application of a 0.063% G formulation (S. Carringer, Report 2007/7001660).

Report No. Location (trial no.)	Application				PHI (days)	Portion anal-ysed	Residues (mg/kg)			
	Method/ Formu-lation	kg as/ha	No. of treat-ments	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001660 Wasco, CA/2006 TCI-06-152-06	granular broadcast/ 0.063% G	0.00448	1	BBCH 89	5	nutmeat	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
						hulls	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Wasco, CA/2006 TCI-06-152-07	granular broadcast/ 0.063% G	0.00448	1	BBCH 89	5	nutmeat	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
						hulls	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Terra Bella, CA/2006 TCI-06-152-08	granular broadcast/ 0.063% G	0.00448	1	BBCH 89	5	nutmeat	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
						hulls	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Report No. Location (trial no.)	Application				PHI (days)	Portion anal-ysed	Residues (mg/kg)			
	Method/ Formu-lation	kg as/ha	No. of treat-ments	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
#2007/7001660 Terra Bella, CA/2006 TCI-06-152-09	granular broadcast/ 0.063% G	0.00448	1	BBCH 89	5	nutmeat hulls	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01
#2007/7001660 Hickman, CA/2006 TCI-06-152-10	granular broadcast/ 0.063% G	0.00448	1	BBCH 87	5	nutmeat hulls	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01

Pecans

Table 89 Pecan Field Trials in the USA in 2006. Application of a 0.063% G formulation (S. Carringer, 2007, Report 2007/7001660)

Report No. Location (trial no.)	Application				Portion analysed	PHI (days)	Residues (mg/kg)			
	Method of treatment/ Formu-lation Method of treatment/ Formu-lation	kg as/ha	No. of treat-ments	Growth stage at last treatment			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I 04	M320I23
#2007/7001660 Ray City, GA/2006 TCI-06-152-01	granular broadcast/ 0.063% G	0.00448	1	40% shuck split	nutmeats	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Chula, GA/2006 TCI-06-152-01	granular broadcast/ 0.063% G	0.00448	1	60% shuck split	nutmeats	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Port Barre, LA/2006 TCI-06-152-03	granular broadcast/ 0.063% G	0.00448	1	BBCH 99	nutmeats	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Madill, TX/2006 TCT-06-152-04	granular broadcast/ 0.063% G	0.00448	1	BBCH 89 / Harvest Maturity	nutmeats	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01
#2007/7001660 Anton, OK/2006 TCI-06-152-05	granular broadcast/ 0.063% G	0.00448	1	Shuck Split / Leaf Drop	nutmeats	5	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Oilseed

Cotton

Table 90 Cotton Field Trials in the USA in 2002. Application of a 240 g as/L SC (R. Johnston, Report 2003/5000309)

Report No. Location (trial no.)	Application						PHI (days)	Portion analysed	Residues (mg/kg)			
	Method of treatment	kg as/hL	Water L/ha	kg as/ha	No. of treatments and retreat-ment interval	Growth stage at last treat-ment or date			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
# 2003/5000309 RCN 2002129 Chula, GA/2002	broadcast foliar application	0.109 -0.116	252-278	0.29 - 0.3			22	undelinted seed	0.11, 0.10	0.23, 0.21	0.01, 0.01	< 0.01, < 0.01
								cotton gin byproducts	4.30, 3.19	9.36, 6.75	0.28, 0.28	0.18, 0.16
# 2003/5000309 RCN 2002130 Proctor, AR/2002	broadcast foliar application	0.140-0.143	206-209	0.29 - 0.3	4 RTI=6-7d	About 70%of bolls open	21	undelinted seed	0.03, 0.01	0.07, 0.03	< 0.01, < 0.01	< 0.01, < 0.01
# 2003/5000309 RCN 2002131 Wall, MS/ 2002	broadcast foliar application	0.113-0.119	245-255	0.29	4 RTI=7d	About 60%of bolls open	20	undelinted seed	0.02, < 0.01	0.02, 0.01	< 0.01, < 0.01	< 0.01, < 0.01
# 2003/5000309 RCN 2002132 Newport, AR/2002	broadcast foliar application	0.104	279-285	0.29 - 0.3	4 RTI=7-8d	About 30%of bolls open	23	undelinted seed	< 0.01, < 0.01	< 0.01, 0.01	< 0.01, < 0.01	< 0.01, < 0.01
# 2003/5000309 RCN 2002133 Uvalde, TX/2002	broadcast foliar application	0.147 -0.155	184-194	0.28 - 0.29	4 RTI=7d	About 50%of bolls open	19	undelinted seed	< 0.01, < 0.01	0.02, 0.01	< 0.01, < 0.01	< 0.01, < 0.01
								cotton gin byproducts	3.68, 3.98	8.68, 10.24	0.18, 0.21	0.24, 0.25
# 2003/5000309 RCN 2002134 Colony, OK/ 2002	broadcast foliar application	0.152 -0.154	186-190	0.29	4 RTI=6-9d	About 70%of bolls open	34	undelinted seed	0.03, 0.03	0.05, 0.07	< 0.01, < 0.01	< 0.01, < 0.01
								cotton gin byproducts	1.28, 1.22	2.50, 2.78	0.21, 0.17	0.11, 0.09
# 2003/5000309 RCN 2002135 Littlefield, TX/2002	broadcast foliar application	0.151 -0.158	186-192	0.28 - 0.30	4 RTI=6-7d	About 80%of bolls open	35	undelinted seed	0.01, < 0.01	0.03, 0.02	< 0.01, < 0.01	< 0.01, < 0.01
								cotton gin byproducts	2.81, 1.71	6.46, 3.69	0.44, 0.30	0.39, 0.25

Report No. Location (trial no.)	Application						PHI (days)	Portion analysed	Residues (mg/kg)			
	Method of treatment	kg as/hL	Water L/ha	kg as/ha	No. of treatments and retreat-ment interval	Growth stage at last treat-ment or date			BAS 320 I E-isomer	BAS 320 I Z-isomer	M320I04	M320I23
# 2003/5000309 RCN 2002136 Levelland, TX/2002	broadcast foliar application	01.52 -0.154	185-193	0.28 - 0.3	4 RTI=6-8d	About 70%of bolls have attained their final size	21	undelinted seed	0.02, < 0.01	0.04, 0.01	< 0.01, < 0.01	< 0.01, < 0.01
# 2003/5000309 RCN 2002137 Levellland, TX/2002	broadcast foliar application	0.156-0.157	188-190	0.29 - 0.3	4 RTI=6-7d	About 80%of bolls open	1 14 21 29 36	undelinted seed	0.01, 0.01 < 0.01, 0.01 0.02, < 0.01 0.02, 0.01 0.01 < 0.01	0.04, 0.03 0.01, 0.02 0.02, 0.01 0.04, 0.03 0.03, 0.02	< 0.01, < 0.01 < 0.01, < 0.01 0.02, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01	< 0.01, < 0.01 < 0.01, < 0.01 0.02, < 0.01 < 0.01, < 0.01 < 0.01, < 0.01
# 2003/5000309 RCN 2002138 Maricopa, AZ/2002	broadcast foliar application	0.103-0.105	276-279	0.29	4 RTI=7d	About 70%of bolls open	25	undelinted seed cotton gin byproducts	< 0.01, < 0.01 1.46, 0.88	0.01, 0.02 2.91, 1.70	< 0.01, < 0.01 0.20, 0.19	< 0.01, < 0.01 0.11, 0.11
# 2003/5000309 RCN 2002139 Porterville, CA/2002	broadcast foliar application	0.099-0.111	262-297	0.29	4 RTI=7d	About 70%of leaves discoloured or fallen	21	undelinted seed cotton gin byproducts	0.02, 0.02 7.59, 6.13	0.04, 0.04 16.8, 13.2	< 0.01, < 0.01 0.85, 0.81	< 0.01, < 0.01 0.87, 0.82
# 2003/5000309 RCN 2002140 Fresno, CA/2002	broadcast foliar application	0.104	278-284	0.29	4 RTI=7d	Beginning of boll opening: about 10% of bolls open	21	undelinted seed	< 0.01, < 0.01	0.02, < 0.01	< 0.01, < 0.01	< 0.01, < 0.01

Table 91 Cotton Field Trials in Member States of the European Union in 2002 and 2004. Application of a 240 g as/L SC (E. Raunft,, Report 2003/1009786; H. Schulz, Report 2003/1009792; E. Schroth, Report 2004/1024761)

Report No. Location (trial no.)	Application						PHI (days)	Portion analysed	Residue (mg/kg)				
	Method of treatment	kg as/hL	Water L/ha	kg as/ha	No. of Treat-ments	Growth stage at last treat-ment BBCH			BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I 04	M320I 23
#2003/1009786 ALO/21/02 E-41727 Maribanez, Sevilla, Spain	medium volume foliar application using boom	0.066	400	0.264	2	78	0	pl. w/o root	3.12	4.70	7.8	0.04	< 0.01
							7	pl. w/o root	0.80	1.73	2.5	0.16	0.06
							14	pl. w/o root	0.44	0.93	1.4	0.09	0.07
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
#2003/1009786 ALO/21/02 E-41727 Maribanez, Sevilla, Spain	medium volume foliar application using boom	0.054	400	0.216	2	78	0	pl. w/o root	2.40	3.73	6.1	0.05	< 0.01
							7	pl. w/o root	0.93	1.96	2.9	0.16	0.07
							15	pl. w/o root	0.31	0.64	0.95	0.08	0.04
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
#2003/1009786 AYE/19/02 41720 Los Palacios, Sevilla, Spain	medium volume foliar application using boom	0.066	400	0.264	2	81	0	pl. w/o root	4.15	6.80	11	0.15	0.04
							7	pl. w/o root	0.55	1.13	1.7	0.10	0.02
							15	pl. w/o root	0.18	0.39	0.57	0.05	0.03
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
#2003/1009786 AYE/19/02 41720 Los Palacios, Sevilla, Spain	medium volume foliar application using boom	0.054	400	0.216	2	81	0	pl. w/o root	2.15	3.26	5.4	0.07	< 0.01
							7	pl. w/o root	0.31	0.60	0.91	0.05	< 0.01
							15	pl. w/o root	0.19	0.37	0.56	0.04	0.03
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
#2003/1009792 02RF031/1 plot2 Kria Vrisi Pella, GR-58300, Greece	foliar application	0.066 0.065	403 385	0.264 0.252	2	79	0	pl. w/o root	2.58	3.33	5.9	0.04	0.01
							6	pl. w/o root	1.39	2.44	3.8	0.13	0.03
							14	pl. w/o root	0.59	1.06	1.6	0.05	0.02
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
#2003/1009792 02RF031/1 plot 3 Kria Vrisi Pella, GR-58300, Greece	foliar application	0.053 0.054	382 383	0.204 0.205	2	79	0	pl. w/o root	1.63	2.17	3.8	0.02	< 0.01
							6	pl. w/o root	0.79	1.37	2.2	0.06	0.02
							14	pl. w/o root	0.13	0.24	0.37	0.02	< 0.01
							22	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01
							29	seed	< 0.01	< 0.01	< 0.02	< 0.01	< 0.01

Report No. Location (trial no.)	Application						PHI (days)	Portion analysed	Residue (mg/kg)				
	Method of treatment	kg as/hL	Water L/ha	kg as/ha	No. of Treat-ments	Growth stage at last treat-ment BBCH			BAS 320 I E-isomer	BAS 320 I Z-isomer	E + Z	M320I 04	M320I 23
#2003/1009792 02RF031/2 plot 2 Gefyra Thessaloniki, GR-57011, Greece	foliar application	0.065 0.065	412 387	0.269 0.252	2	79-81	0 7 14 21 27	pl. w/o root pl. w/o root pl. w/o root seed seed	2.78 1.12 0.77 0.01 < 0.01	3.22 2.00 1.45 0.02 < 0.01	6.0 3.1 2.2 0.03 < 0.02	0.05 0.19 0.15 < 0.01 < 0.01	0.01 0.03 0.04 < 0.01 < 0.01
#2003/1009792 02RF031/2 plot 3 Gefyra Thessaloniki, GR-57011, Greece	foliar application	0.053 0.053	387 406	0.207 0.217	2	79-81	0 7 14 21 27	pl. w/o root pl. w/o root pl. w/o root seed seed	3.11 0.74 0.30 < 0.01 < 0.01	3.50 1.34 0.60 0.01 < 0.01	6.6 2.2 0.90 0.02 0.02	0.05 0.13 0.08 < 0.01 < 0.01	0.01 0.03 0.02 < 0.01 < 0.01
#2004/1024761 E-41717 Maribanez Sevilla, Spain (ALO/09/04)	foliar application with boom	0.06	400	0.24	2	79	0 6 13 21 27	plants plants plants seed seed	4.15 1.02 0.39 0.01 < 0.01	4.16 2.06 0.90 0.04 0.02	8.3 3.1 1.3 0.05 0.03	0.13 0.10 0.05 < 0.01 < 0.01	0.05 0.05 0.04 < 0.01 < 0.01
#2004/1024761 E-41729 Frajano Sevilla, Spain (ALO/10/04)	foliar application with boom	0.06	400	0.24	2	79	0 6 13 21 27	plants plants plants seed seed	3.43 1.09 0.55 < 0.01 < 0.01	3.70 2.23 1.19 < 0.01 < 0.01	7.1 3.3 1.7 < 0.02 < 0.02	0.06 0.11 0.08 < 0.01 < 0.01	0.03 0.05 0.04 < 0.01 < 0.01
#2004/1024761 G-59100 Imathia Veria, Greece (GRE/07/04)	foliar application with boom	0.06	400	0.24	2	79	0 9 15 22 29	plants plants plants seed seed	4.14 0.81 0.40 < 0.01 < 0.01	1.86 1.55 0.79 < 0.01 < 0.01	6.0 2.4 1.2 < 0.02 < 0.02	0.13 0.23 0.09 < 0.01 < 0.01	0.02 0.05 0.03 < 0.01 < 0.01
#2004/1024761 G-59100 Imathia Veria, Greece (GRE/08/04)	foliar application with boom	0.06	400	0.24	2	79	0 8 15 24 29	plants plants plants seed seed	4.47 1.26 0.61 < 0.01 < 0.01	5.09 2.64 1.29 < 0.01 < 0.01	9.6 3.9 1.9 < 0.02 < 0.02	0.30 0.42 0.14 < 0.01 < 0.01	0.05 0.09 0.06 < 0.01 < 0.01

FATE OF RESIDUES IN STORAGE AND IN PROCESSING

In storage

No information was provided on the fate of metaflumizone residues under commercial storage conditions.

In processing

Nature of the Residue in Processing

Hydrolyses of benzonitrile ring-U-^{14}C metaflumizone and trifluromethoxyphenyl ring-U-^{14}C metaflumizone were conducted at 90 °C in pH 4 aqueous buffer for 20 minutes (pasteurization simulation), at 100 °C in pH 5 aqueous buffer for 60 minutes (baking, brewing, boiling simulation), and at 120 °C in pH 6 aqueous buffer for 20minutes (sterilization simulation) (C. Fang, 2004, Report 2004/7007519). Sterile conditions were maintained during the course of each hydrolysis experiment.

Samples from each treatment group were processed and analysed at zero time and after the appropriate incubation time by LSC and HPLC. The ethyl acetate extract of each sample and residual aqueous phase of the samples from selected treatments were assayed by LSC. HPLC (radiometric and uv 280 nm) was used to identify and quantify the radioactivity present in the extracts. Results are summarized in Table 92.

Table 92 Radioactive Residue Distribution (% total applied radioactivity) (C. Fang, Report 2004/7007519)

Benzonitrile Label, % total applied radioactivity									
Test system	Unk 1	Unk 2	M320I04	Unk 4	Unk 5	Unk 6	M320I02 Z-isomer	M320I01 E-isomer	E + Z
pH4, 90 °C Zero min			3.22	3.42			8.78	88.76	97.5
pH4, 90 °C 20 min		1.04	14.8	2.53	1.90		7.00	71.42	78.4
pH5, 100 °C Zero min				2.81			8.24	85.70	93.9
pH5, 100 °C 60 min	1.24	1.36	25.94	3.12	3.22	2.89	9.97	52.07	62.0
pH6, 120 °C Zero min							10.22	90.45	100.7
pH6, 120 °C 20 min		2.47	3.53	2.50			7.99	81.38	89.4

Trifluoromethoxyphenyl Label, % total applied radioactivity								
Test system	M320I05	M320I08 (Unk 8)[a]	Unk 9	Unk 10	M320I02 Z-isomer	M320101 E-isomer	Unk 11	E + Z
pH4, 90° C Zero min					8.21	94.87		103.
pH4, 90° C 20 min		7.69	4.47	1.41	7.40	69.57	1.17	77.0
pH5, 100° C Zero min				1.61	8.75	90.16		98.9
pH5, 100° C 60 min	5.05	1.68		1.43	10.75	82.42		93.2
pH6, 120° C Zero min					9.99	90.33		100.
pH6, 120° C 20 min					9.03	84.59		93.6

[a] The unknown metabolite (Unk 8) at approximately 8% of total applied radioactivity with a retention time of approximately 14.0 minutes was observed at pH 4 after 20 minutes of incubation (trifluoromethoxyphenyl label). Results from HPLC and LC-MS analyses indicated that this Unk 8 is a solvent adduct formed from M320I08 during sample workup and during HPLC and LC-MS analyses.

The proposed hydrolytic pathway of metaflumizone is shown below (Figure 10).

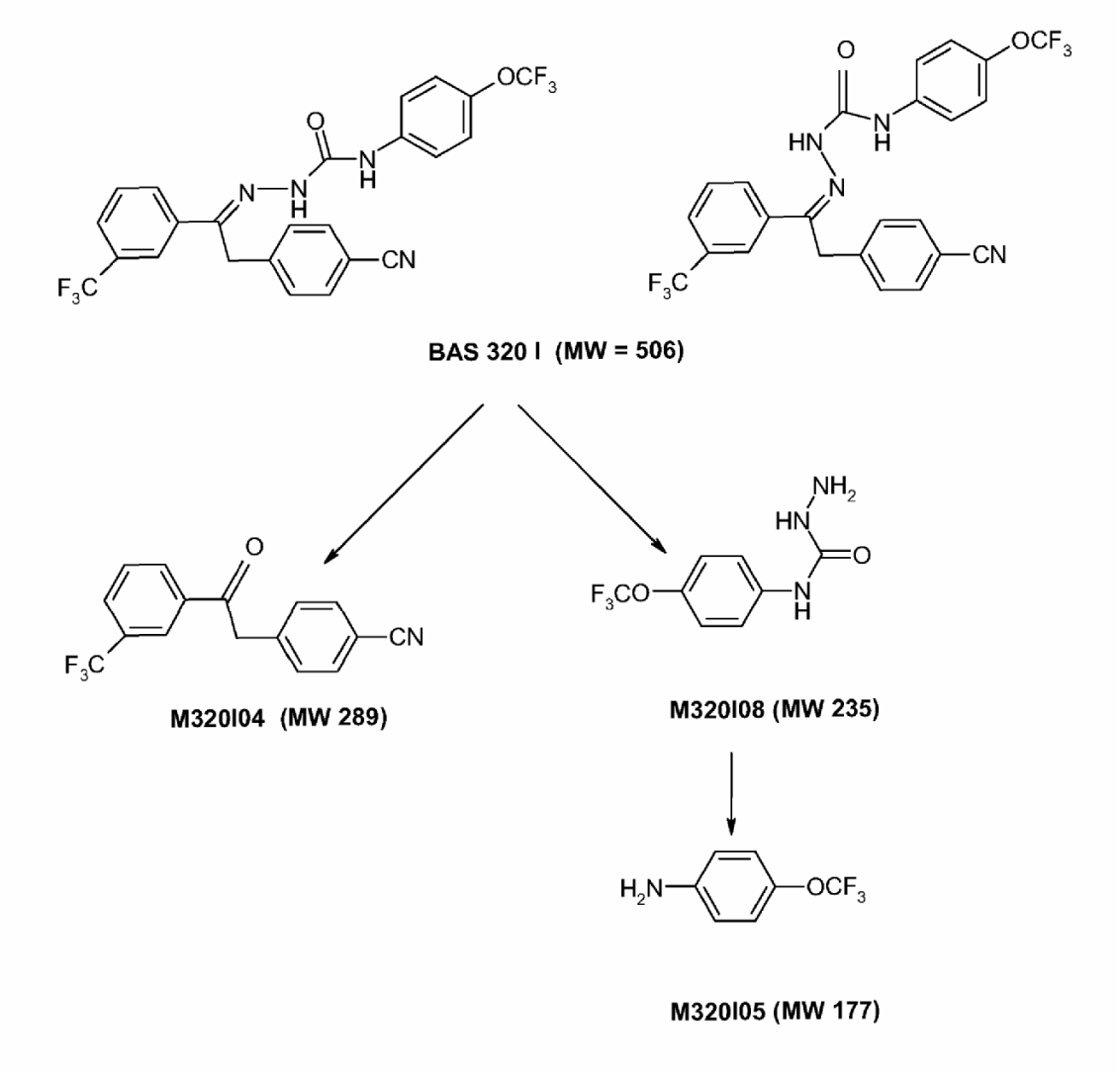


Figure 10 Proposed hydrolysis pathway for metaflumizone

Magnitude of the Residue in Processing

Processing studies were provided for tomato, cabbage, lettuce, potato, and cotton seed.

Tomato

Tomato plants at four field sites in Pennsylvania and in California, USA, were treated with a 240 g as/L SC formulation of metaflumazone (4 × 0.29 kg ai/ha, PHI 0 day) in order to determine the magnitude of the residues of the insecticide in processed tomato fractions (R Johnston, 2004, Report 2004/5000203). Whole tomato samples were collected as the raw agricultural commodity at normal crop maturity and delivered fresh within 1 day of harvest to The National Food Laboratory, Dublin, CA.

Tomatoes were processed according to typical commercial practices. The tomatoes to be processed were passed through a washing flume/spray washer. The washed tomatoes were ground and crushed, and the crush was pumped into a hot break system. A swept-surface heat exchanger or a tubular heat exchanger was utilized. After heating at 90 °C, the product was sent to the finisher. Juice was removed for canning of tomato juice and for canning of tomatoes in juice. The remainder of the juice was condensed to puree using a vacuum evaporator and filled into cans at 90 °C. The natural tomato soluble solids were in the range of 8 to 16%. The pomace was sampled.

Tomatoes were peeled by immersing them in boiling water until the peel cracked or shriveled. The tomatoes were cooled in a colander with a cool water spray and manually peeled. The tomatoes were filled into cans, and the remaining space was filled with tomato juice at 78 °C. The cans were seemed and retorted for 50 minutes at ≥ 116 °C.

Processed tomato samples were analysed for metaflumizone, M320I04 and M320I23 using BASF Analytical Method Number 531/0 (HPLC-MS/MS). Concurrent recoveries of metaflumizone (E- and Z-isomer), M320I04 and M320I23 from 27 control tomato processed fraction samples fortified with each analyte at 0.01, 0.10 or 0.50 mg/kg, were 70–115% (88±10), 68-99% (89±7), 75–110% (87±8), and 78-104% (92±6, n = 26), respectively. The estimated LOD and the LOQ for residues of each analyte in tomato processed fractions are 0.002 and 0.01 mg/kg, respectively.

Results are summarized in Table 93.

Table 93 Four Processing Studies on Tomatoes in the USA (R. Johnston, Report 2004/5000203)

Matrix	Residues					Concentration Factor
	E-isomer	Z-isomer	M320I04 [b]	M320I23	E- + Z	
Unwashed						
2002162-015	0.024	0.037	< 0.0175	< 0.01	0.061	
2002165-015	0.080	0.068	< 0.0175	< 0.01	0.148	
2002166-028	0.053	0.053	< 0.0175	< 0.01	0.106	
2002167-028 [a]	0.163	0.276	0.056	< 0.01	0.439	
Washed Tomatoes						
2002162-016	0.016	0.029	< 0.0175	< 0.01	0.045	0.74
2002165-016	0.055	0.062	< 0.0175	< 0.01	0.117	0.79
2002166-029	0.027	0.026	< 0.0175	< 0.01	0.053	0.50
2002167-029	0.074	0.128	0.035	< 0.01	0.202	0.46
Average/ Median						0.62/ 0.62
Wash water						
2002162-017	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	
2002165-017	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	
2002166-030	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	
2002167-030	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	
Juice						
2002162-018	< 0.01	< 0.01	0.047	< 0.01	< 0.02	< 0.33
2002165-018	< 0.01	< 0.01	0.071	< 0.01	< 0.02	< 0.14
2002166-031	< 0.01	< 0.01	0.041	< 0.01	< 0.02	< 0.19
2002167-031 [a]	< 0.01	< 0.01	0.057	< 0.01	< 0.02	< 0.046
Average/ Median						< 0.18/ < 0.16
Wet Pomace						
2002162-019 [a]	0.060	0.034	0.20	< 0.01	0.094	1.5
2002165-019 [a]	0.21	0.14	0.526	0.016	0.35	2.4
2002166-032	0.158	0.174	0.392	< 0.01	0.332	3.1
2002167-032	0.206	0.256	0.359	0.013	0.462	1.1
Average/ Median						2.0/ 2.0

Matrix	Residues					Concentration Factor
	E-isomer	Z-isomer	M320I04 [b]	M320I23	E- + Z	
Puree						
2002162-020	0.019	< 0.01	0.049	< 0.01	0.029	0.48
2002165-020	0.020	< 0.01	0.04	< 0.01	0.030	0.20
2002166-033	0.035	< 0.01	0.065	< 0.01	0.045	0.42
2002167-033 [a]	0.09	< 0.01	0.15	< 0.01	0.10	0.23
Average/ Median						0.33/ 0.32
Canned tomatoes						
2002162-022	< 0.01	< 0.01	0.018	< 0.01	< 0.02	< 0.33
2002165-022	< 0.01	< 0.01	0.073	< 0.01	< 0.02	< 0.14
2002166-035	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.19
2002167-035	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.046
Average/ Median						< 0.18/ < 0.16
Peeled tomatoes						
2002162-023	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.33
2002165-023	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.14
2002166-036	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.19
2002167-036	< 0.01	< 0.01	< 0.0175	< 0.01	< 0.02	< 0.046
Average/ Median						< 0.18/ < 0.16
Tomato peels						
2002162-024 [a]	0.12	0.20	0.13	< 0.01	0.32	5.2
2002165-024	0.045	0.043	0.02	< 0.01	0.088	0.72
2002166-037	0.048	0.059	0.029	< 0.01	0.107	1.0
2002167-037	0.127	0.234	0.095	< 0.01	0.361	0.82
Average/ Median						1.9/ 0.91
Tomato Paste						
2002162-021 [a]	0.08	< 0.01	0.24	< 0.01	0.09	1.5
2002165-021 [a]	0.12	< 0.01	0.30	< 0.01	0.13	0.80
2002166-034	0.084	< 0.01	0.236	< 0.01	0.094	0.89
2002167-034	0.229	< 0.01	0.51	0.010	0.239	0.54
Average/ Median						1.1/ 0.84

[a] Average of 3 analyses.

[b] Converted to metaflumizone equiavalents, 1.75 × M320I04 mg/kg.

Cabbage

Head cabbage plants at four sites in Germany were treated with a 240 g as/L SC formulation of metaflumizone twice at a rate of 0.72 kg as/ha (total seasonal rate: 1.44 kg as/ha (H. Harant,2008, Report 2008/1043891). Cabbage head samples were collected (41–160 kg/sample) one day after the last application and delivered fresh to the processing facility BioChem Agrar, D-04827 Gerichshain (Germany). The processed fractions produced and analysed for this study were outer leaves, inner leaves, stalk inside white head, cooked cabbage, cooking liquid, fermented cabbage, and juice of fermented cabbage. Processed head cabbage samples were analysed for metaflumizone, M320I04 and M320I23 using BASF Analytical Method Number 531/1 (HPLC-MS/MS). The LOQ for residues of each analyte in/on white cabbage RAC and processed commodities is 0.02 mg/kg for metaflumizone (sum of E- and Z-Isomer, each 0.01 mg/kg) and 0.01 mg/kg for the metabolites M320I04 and M320I23.

Table 94 Four Processing Studies for Cabbage Conducted in Germany (H. Harant, Report 2008/1043891)

Matrix		Residues (mg/kg)				Processing Factor	
		FR 37/05/40	FR 37/05/72	FR 37/05/70	FR 37/05/71	Trial	Mean/ Median
Cabbage head (RAC)	Metaflumizone (E-isomer)	0.46	0.77	2.06	1.05		
	Metafluizone (Z-isomer)	0.26	1.00	2.34	1.33		
	M320I04 [a]	0.02	0.02	0.04	0.02		
	M320I23	0.01	0.01	0.02	0.01		
	E+ Z	0.72	1.77	4.40	2.38		
Inner leaves	Metaflumizone (E-isomer)	< 0.01	< 0.01	0.02	0.01		
	Metaflumizone (Z-isomer)	< 0.01	< 0.01	0.02	0.01		
	M320I04 [a]	< 0.018	< 0.018	< 0.018	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	< 0.02	< 0.02	0.04	0.02	< 0.028 < 0.011 < 0.009 < 0.008	0.014/ 0.010
Outer leaves	Metaflumizone (E-isomer)	4.99	4.57	7.91	4.83		
	Metaflumizone (Z-isomer)	2.79	5.92	8.99	6.11		
	M320I04 [a]	0.05	0.04	0.07	0.05		
	M320I23	0.03	0.02	0.06	0.03		
	E+ Z	7.78	10.49	16.90	10.94	11 5.9 3.8 4.4	6.3/ 5.2
Stalk inside of white head	Metaflumizone (E-isomer)	< 0.01	< 0.01	0.04	0.02		
	Metaflumizone (Z-isomer)	< 0.01	< 0.01	0.04	0.01		
	M320I04	< 0.018	< 0.018	< 0.018	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	< 0.02	< 0.02	0.08	0.03	< 0.028 < 0.011 0.018 0.013	0.013/ 0.018
Head cabbage, cooked [b]	Metaflumizone I (E-isomer)	0.03	< 0.01	0.06	0.01		
	Metaflumizone (Z-isomer)	0.01	< 0.01	0.03	< 0.01		
	M320I04 [a]	< 0.018	< 0.018	< 0.018	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	0.04	< 0.02	0.09	0.02	0.056 < 0.011 0.020 0.008	0.042/ 0.055
Cooking liquid	Metaflumizone (E-isomer)	< 0.01	< 0.01	< 0.01	< 0.01		
	Metaflumzione (Z-isomer)	< 0.01	< 0.01	< 0.01	< 0.01		
	M320I04 [a]	< 0.018	< 0.018	< 0.018	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	< 0.02	< 0.02	< 0.02	< 0.02	< 0.028 < 0.011 < 0.009 < 0.008	0.014/ 0.010
Fermented Cabbage (sauerkraut)	Metaflumizone (E-isomer)	< 0.01	0.02	0.04	0.02		
	Metaflumizone (Z-isomer)	< 0.01	< 0.01	< 0.01	< 0.01		
	M320I04 [a]	< 0.018	0.02	0.04	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	< 0.02	0.03	0.05	0.03	< 0.028 0.017 0.011	0.017/ 0.012

Matrix		Residues (mg/kg)				Processing Factor	
		FR 37/05/40	FR 37/05/72	FR 37/05/70	FR 37/05/71	Trial	Mean/ Median
						0.013	
Juice of fermented cabbage	Metaflumizone (E-isomer)	< 0.01	< 0.01	0.01	< 0.01		
	Metaflumizone (Z-isomer)	< 0.01	< 0.01	< 0.01	< 0.01		
	M320I04 [a]	< 0.018	< 0.018	< 0.018	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	< 0.02	< 0.02	0.02	< 0.02	< 0.028 < 0.022 < 0.009 < 0.008	0.014/ 0.010

[a] M320I04 is converted to metaflumizone equivalents, that is, 1.75 X mg/kg M320I04.

[b] After removal of outer leaves and stalk.

Lettuce

Head lettuce plants at four sites in Germany were treated with a 240 g as/L SC formulation of metaflumizone twice at a rate of 0.72 kg as/ha (total seasonal rate: 1.4 kg as/ha). (H. Harant, 2008, Report 2006/1006702). Lettuce head samples were collected one day after the last application and delivered fresh to the processing facility BioChem Agrar, D-04827 Gerichshain (Germany). The processed fractions produced and analysed for this study were outer leaves (unwashed and washed), innerleaves (unwashed and washed) and wash waterProcessed head lettuce samples were analysed for metaflumizone, M320I04 and M320I23 using BASF Analytical Method Number 531/1. The results are summarized in Table 95.

Table 95 Four Processing Studies on Lettuce in Germany (H. Harant, Report 2006/100670)

Matrix	Residue Component	Residues (mg/kg) [a]				Processing Factor	
		FR 40/05/40	FR 40/05/72	FR 40/05/70	FR 40/05/71		Mean/ Median
Lettuce head (RAC)	Metaflumizone (E-isomer)	4.84	5.87	9.08	10.33		
	Metaflumizone (Z-isomer)	5.99	8.52	9.29	13.92		
	M320I04	0.14	0.35	0.68	0.25		
	M320I23	0.02	0.03	0.05	0.04		
	E+ Z	10.83	14.39	18.37	24.25		
Outer leaves	Metaflumizone (E-isomer)	9.72	12.70	15.05	16.52		
	Metaflumizone (Z-isomer)	10.36	18.08	18.51	20.15		
	M320I04	0.16	0.91	0.91	0.51		
	M320I23	0.03	0.08	0.07	0.06		
	E+ Z	20.08	30.78	33.56	36.67		
Inner leaves	Metaflumizone (E-isomer)	1.74	2.81	3.25	13.39		
	Metaflumizone (Z-isomer)	1.80	3.08	2.64	15.06		
	M320I04	<0.018	0.09	0.11	< 0.018		
	M320I23	< 0.01	< 0.01	< 0.01	0.02		
	E+ Z	3.54	5.89	5.89	28.45		

Matrix	Residue Component	Residues (mg/kg) [a]				Processing Factor	
		FR 40/05/40	FR 40/05/72	FR 40/05/70	FR 40/05/71		Mean/ Median
Outer leaves washed	Metaflumizone (E-isomer)	2.45	3.49	5.77	4.11		
	Metaflumizone (Z-isomer)	3.34	4.35	8.19	4.95		
	M320I04	0.12	0.19	0.61	0.21		
	M320I23	0.02	0.03	0.05	0.03		
	E+ Z	5.79	7.84	13.96	9.06	0.28[b] 0.25 0.42 0.25	0.30/ 0.26
Inner leaves washed	Metaflumizone (E-isomer)	0.27	0.36	0.78	0.94		
	Metaflumizone (Z-isomer)	0.29	0.42	0.77	1.43		
	M320I04	< 0.018	< 0.018	0.04	0.04		
	M320I23	< 0.01	< 0.01	< 0.01	< 0.01		
	E+ Z	0.56	0.78	1.55	2.37	0.16[c] 0.13 0.26 0.08	0.16/ 0.14

[a] Expressed as metaflumizone equivalents. For example, mg/kg M320I04 × 1.75

[b] Residue on outer leaves washed / residue on outer leaves.

[c] Residue on inner leaves washed / residue on inner leaves

Potato

Potato plants at four field sites in California, Idaho, South Dakota and Washington were treated with a 240 g as/L SC formulation of metaflumizone four times at 1.5 kg as/ha (total seasonal rate: 5.8 kg as/ha) (R. Johnston, 2004, Report 2003/5000300). Whole samples were collected (≥ 57 kg/sample) 7 days after the last application and delivered fresh within 1 day of harvest to The National Food Laboratories, Inc., Dublin, CA. The fractions produced and analysed for this study were peeled tubers, wash water, wet peel, microwave boiled potatoes, (unpeeled), dried granules (flakes), and chips (crisps). Samples of potato RAC, cooking liquid (liquor) and process waste were also taken.

The potatoes were processed by commercial type procedures. Whole, unwashed potatoes were removed from storage and cleaned with water using a brushwasher. The potatoes were peeled with an abrasion peeled, which yielded peel byproduct. Peeled potatoes were sliced, fried in vegetable oil, and cooled to yield USA potato chips (UK crisps).

For granules (flakes), peeled potatoes were diced, and divided into two batches. One batch was cooked in boiling water until soft. The other batch was smashed, dried, and ground. The cooked dices were mashed and blended with the dried granules until a grainy appearance was achieved. The mixture was dried and ground to produce granules.

Processed potato samples were analysed for metaflumizone, M320I04 and M320I23 using BASF Analytical Method Number 531/0 (LC-MS/MS). Concurrent recoveries of each analyte fortified in control potato RAC and processed commodity samples (n = 18 total) at 0.01, 0.1, or 0.5 mg/kg were 72–106% (91±10%) for metaflumizone (E-isomer); 77–113% (97±9%) for metaflumizone (Z-isomer); 63–93% (77±9%) for M320I04; and 73–133% (102±17%) for M320I23. A few recoveries of the metabolites M320I04 (3 of 18) and M320I23 (5 of 18) were outside the range of 70–120%. The estimate LOD and the LOQ for residues of each analyte in/on potato RAC and processed commodities are 0.002 and 0.01 mg/kg, respectively.

The findings are summarized in Table 96.

Table 96 Four Processing Studies for Potatoes from the USA (R. Johnston, Report 2003/5000300)

RAC (Trial Location)	Processed Commodity	Residues (mg/kg) [a]					Processing Factor [c]
		BAS 320 I (E-isomer)	BAS 320 I (Z-isomer)	M320I04	M320I23	E+ Z	
Potato (Britton, SD) RCN 2002118	Unwashed Tuber (RAC)	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	< 0.018 < 0.018 < 0.018 [< 0.018] [b]	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	< 0.02 < 0.02 < 0.02 [< 002] [b]	---
	Wash water	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peeled tubers	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peel	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Microwaved tuber (with peel)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Granules/flakes	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Chips (crisps)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Waste	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
Potato (Porterville, CA) RCN 2002122	Unwashed Tuber (RAC)	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	< 0.01 < 0.01 0.016 [0.01] [b]	< 0.018 < 0.018 < 0.018 [< 0.018] [b]	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	< 0.02 < 0.02 0.026 [0.022][b]	
	Wash water	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peeled tubers	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peel	0.011	0.015	< 0.018	< 0.01	0.026	
	Microwaved tuber (with peel)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Granules/flakes	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Chips (crisps)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Waste	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
Potato (Payette, ID) RCN 2002125	Unwashed Tuber (RAC)	0.011 < 0.01 < 0.01 [0.01] [b]	0.013 < 0.01 < 0.01 [0.01] [b]	< 0.018 < 0.018 < 0.018 [< 0.018] [b]	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	0.025 < 0.02 < 0.02 [0.021]	
	Wash water	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peeled tubers	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peel	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Microwaved tuber (with peel)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Granules/flakes	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Chips (crisps)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Waste	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
Potato (Ephrata, WA) RCN 2002128	Unwashed Tuber (RAC)	< 0.01 < 0.01 < 0.01 [< 0.01] [b]	0.011 0.013 0.011 [0.01] [b]	< 0.018 < 0.018 < 0.018 [< 0.018][b]	< 0.01 < 0.01 < 0.01 [< 0.01][b]	0.021 0.023 0.022 [0.021][b]	
	Wash water	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peeled tubers	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Peel	0.011	0.013	< 0.018	< 0.01	0.024	
	Microwaved tuber (with peel)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Granules/flakes	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Chips (crisps)	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	
	Waste	< 0.01	< 0.01	< 0.018	< 0.01	< 0.02	

[a] Expressed as metaflumizone equivalents. For example, mg/kg M320!04 × 1.75.

[b] Average

[c] Factors cannot be calculated due to the general lack of quantifiable residue in the RAC and in the processed commodities.

Cotton

Cotton plants at one field site in Arkansas were treated with a 240 g as/L SC formulation of metaflumizone 4 times at a single application rate of 1.4–1.5 kg as/ha (total seasonal rate 5.8 kg as/ha) (J. Jordan, 2005,Report 2005/5000005). Seed samples were collected 21 after the last application, and delivered fresh within 1 day of harvest to the Food Protein Research and Development Center (Bryan, TX).

Cotton seed was processed by a commercial-type solvent extraction procedure. The seed was cleaned to remove burrs, sticks, and other plant parts (gin trash). The lint ctoon was saw-ginned and then saw-delinted. The delinted seed was cracked in a Bauer mill, and the hull separated from the kernel. The kernels were dreid in an oven at 108 °C (maximum), and then flaked in a roll mill. The flakes were feed into an expander/extruder fitted with die. Steam was injected directly into the collets, with an exiting temperature of 113 °C maximum. The collets were dried, ground, and extracted 3 times with hexane (60 °C, 30 minutes). The crude oil/hexane was passed through a vacuum evaporator, and the crude oil was recovered between 73 and 90 °C.

Processed cotton samples were analysed for metaflumizone, M320I04 and M320I23 using BASF Analytical Method Number 531/0. Concurrent recoveries of each analyte fortified in control cotton seed and processed commodity samples (n = 10 total) at 0.01–1.0 mg/kg were 63–113% (90±14%) for metaflumizone I (E-isomer); 83–139% (105±20%) for metaflumizone I (Z-isomer); 69–151% (106±23%) for M320I04; and 70–128% (109±21%) for M320I23. The estimated LOD and the LOQ for residues of each analyte in/on cotton RAC and processed commodities are 0.002 and 0.01 mg/kg, respectively.

The results are given in Table 97.

Table 97 Processing study for cotton seed from the USA (J. Jordan, Report 2005/5000005).

Location Trial	Matrix	Residue (mg/kg) [a]					Factor
		BAS 320 I (E-isomer)	BAS 320 I (Z-isomer)	M320I04	M320I23	E+ Z	
Proctor, Arkansas RCN 2004167	Undelinted cotton seed (RAC)	0.204 0.212	0.240 0.358	0.081 0.127	0.012 0.018	0.444 0.570 [0.507][b]	
	Meal	0.044 0.051	0.011 0.014	< 0.018 < 0.018	< 0.010 < 0.010	0.055 0.065 [0.060][b]	0.12
	Hulls	0.340 0.534	0.202 0.244	0.039 0.052	< 0.0 10 < 0.010	0.542 0.778 [0.660][b]	1.3
	Oil, crude	0.416 0.346	0.131 0.115	0.019 < 0.018	< 0.010 < 0.010	0.547 0.479 [0.513][b]	1.0
	Oil, refined	0.366 0.348	0.133 0.142	< 0.018 < 0.018	< 0.010 < 0.010	0.499 0.490 [0.494][b]	0.97

[a] Expressed as metaflumizone equivalents. For example, mg/kg M320I04 × 1.75

[b] Average

RESIDUES IN ANIMAL COMMODITIES

Farm animal feeding studies

The Meeting received chicken and dairy cow feeding studies.

Leghorn white hens were dosed once daily by gelatin capsules for 55 days (N. Tilting, 2004, Report 2004/1020818). The hens were divided into four groups of 15 hens each. The metaflumizone dosing levels were Group 1: control group; Group 2: 0.1 mg/kg feed (0.012 mg ai/day); Group 3: 0.3 mg/kg feed (0.036 mg a.i./day); and Group 4: 1.0 mg/kg feed (0.12 ai / day). Eggs were collected twice daily for the following days: –1, 1, 3, 5, 8, 12, 15, 18, 21, 25, 28, 32, 35, 39, 42, 46, 50, 55 and on depuration days 0, 3, 7, 10, 14, 17, 27. They were sacrificed within 24 hours of the final dosing, except for those maintained for the depuration part of the study. Liver (total organ), muscle (breast and leg), and fat (peritoneal) were sampled and stored on a per hen basis. Samples were stored frozen for no than 28 days (–20 °C).

BASF Method 528/0 (HPLC-MS/MS) was used to analyse samples. Homogenized samples were extracted with methanol, and solids were removed by centrifugation. Saturated sodium chloride solution was added to an aliquot of the supernatant and was partitioned against dichloromethane. The residue was determined by means of HPLC-MS-MS. E and Z isomers of metaflumizone were determined separately and the results added. The LOQ of the method was 0.005 mg/kg for each isomer in eggs and 0.01 mg/kg for each isomer in tissues, as determined from analysis of control samples spiked with equal amounts of E and Z isomers of metaflumizone.

Findings are summarized in Table 98 and in Table 99.

Table 98 Residue Data for Eggs and Tissues Collected from a Poultry Feeding Study with Metaflumizone in the USA (N. Tilting, Report 2004/1020818)

Sample Day	Residues of Total Metaflumizone (E + Z isomers)[a] in ppm by Feeding Level			
	Control	0.1 ppm	0.3 ppm	0.9 ppm
Eggs				
-1	< 0.01 (n = 4)	< 0.01, < 0.01, < 0.01, < 0.01	< 0.01, < 0.01, < 0.01, < 0.01	< 0.01, < 0.01, < 0.01, < 0.01, < 0.01, < 0.01, < 0.01, < 0.01
1	< 0.01 (n = 4)	< 0.01, < 0.01, < 0.01, < 0.01	< 0.01, < 0.01, < 0.01, < 0.01	0.010, 0.011, 0.016, 0.017, 0.017, 0.017, 0.020, 0.026
3	< 0.01 (n = 4)	< 0.01, < 0.01, 0.011, 0.011	0.015, 0.015, 0.022, 0.022	0.031, 0.044, 0.044, 0.054, 0.061, 0.065, 0.074, 0.079
5	< 0.01 (n = 4)	< 0.01, 0.012, 0.013, 0.016	0.030, 0.034, 0.034, 0.041	0.089, 0.090, 0.101, 0.110, 0.111, 0.113, 0.131, 0.136
8	< 0.01 (n = 4)	0.017, 0.018, 0.021, 0.023	0.029, 0.050, 0.065, 0.068	0.113, 0.127, 0.132, 0.151, 0.163, 0.170, 0.176, 0.190
12	< 0.01 (n = 4)	0.020, 0.023, 0.024, 0.028	0.049, 0.057, 0.061, 0.062	0.125, 0.134, 0.155, 0.201, 0.208, 0.212, 0.230, 0.247
15	< 0.01 (n = 4)	0.020, 0.025, 0.027, 0.029	0.063, 0.068, 0.070, 0.075	0.153, 0.158, 0.209, 0.217, 0.257, 0.264, 0.284, 0.336
18	< 0.01 (n = 4)	0.024, 0.026, 0.037, 0.039	0.054, 0.087, 0.095, 0.095	0.147, 0.169, 0.180, 0.245, 0.304, 0.306, 0.315, 0.339
21	< 0.01 (n = 4)	0.015, 0.022, 0.027, 0.035	0.071, 0.078, 0.081, 0.131	0.062, 0.196, 0.233, 0.252, 0.313, 0.316, 0.394, 0.405
25	< 0.01	0.030, 0.034, 0.040, 0.041	0.071, 0.084, 0.094, 0.200	0.262, 0.450, 0.514, 0.605,

Sample Day	Residues of Total Metaflumizone (E + Z isomers)[a] in ppm by Feeding Level			
	Control	0.1 ppm	0.3 ppm	0.9 ppm
	(n = 4)			0.616, 0.626, 0.651, 0.899
28	< 0.01 (n = 4)	0.033, 0.040, 0.044, 0.044	0.103, 0.116, 0.135, 0.186	0.199, 0.367, 0.402, 0.440, 0.446, 0.482, 0.486, 0.520
32	< 0.01 (n = 4)	0.040, 0.044, 0.045, 0.047	0.086, 0.091, 0.129, 0.139	0.239, 0.262, 0.305, 0.342, 0.365, 0.404, 0.430, 0.447
35	< 0.01 (n = 4)	0.031, 0.036, 0.038, 0.042	0.087, 0.098, 0.121, 0.149	0.281, 0.297, 0.357, 0.388, 0.465, 0.466, 0.471, 0.491
39	< 0.01 (n = 4)	0.038, 0.039, 0.042, 0.050	0.091, 0.106, 0.127, 0.127	0.215, 0.285, 0.406, 0.407, 0.408, 0.409, 0.442, 0.557
42	< 0.01 (n = 4)	0.037, 0.041, 0.043, 0.058	0.145, 0.145, 0.163, 0.204	0.358, 0.498, 0.544, 0.571, 0.613, 0.644, 0.732, 0.909
46	< 0.01 (n = 4)	0.041, 0.046, 0.049, 0.054,	0.121, 0.129, 0.134, 0.146	0.357, 0.383, 0.386, 0.389, 0.414, 0.449, 0.468, 0.524
50	< 0.01 (n = 4)	0.043, 0.044, 0.046, 0.055	0.117, 0.129, 0.133, 0.166	0.331, 0.442, 0.468, 0.481, 0.502, 0.555, 0.597, 0.784
55	< 0.01 (n = 4)	0.038, 0.049, 0.061	0.116, 0.130, 0.156, 0.295	0.345, 0.358, 0.441, 0.461, 0.482, 0.560, 0.573, 0.604
0 (after withdrawal)				0.288, 0.401, 0.434, 0.436
3 (after withdrawal)				0.460, 0.545, 0.647
7 (after withdrawal)				0.184, 0.384
10 (after withdrawal)				0.207, 0.333
14 (after withdrawal)				0.155
17 (after withdrawal)				0.117
27 (after withdrawal)				0.052
Muscle				
Day 56 (At sacrifice)	< 0.02 (n = 4)	< 0.02, < 0.02, < 0.02, 0.021	0.021, 0.024, 0.026, 0.031	0.040, 0.046, 0.051, 0.057
3 (After withdrawal				0.057
7 (After withdrawal				0.044
14 (After withdrawal)				0.029
27 (After withdrawal)				< 0.02
Liver				
Day 56 (At sacrifice)	< 0.02 (n = 4)	0.029, 0.030, 0.032, 0.033	0.081, 0.089, 0.096, 0.114	0.161, 0.217, 0.264, 0.298

Sample Day	Residues of Total Metaflumizone (E + Z isomers)[a] in ppm by Feeding Level			
	Control	0.1 ppm	0.3 ppm	0.9 ppm
3 (After withdrawal)				0.200
7 (After withdrawal)				0.157
14 (After withdrawal)				0.138
27 (After withdrawal)				0.046
Fat				
Day 56 (At sacrifice)	< 0.02 (n = 4)	0.297, 0.303, 0.327, 0.338	0.921, 1.045, 1.051, 1.245	2.649, 2.737, 3.396, 3.493
3 (After withdrawal)				2.689
14 (After withdrawal)				1.917
27 (After withdrawal)				0.513

[a] The LOQs of the method for the sum of the E and Z isomer are 0.01 ppm for eggs and 0.02 ppm for tissues.

Table 99 Summary of Egg and Tissue Residue Data from a Poultry Feeding Study Following Oral Dosing with Metaflumizone for 55 Consecutive Days (N. Tilting, Report 2004/1020818).

Matrix	Feeding Level (ppm)	Residue Levels of Total Metaflumizone (E + Z Isomers) in ppm [a]					
		n	Min.	Max.	Median	Mean	Std. Dev.
Eggs	0.1	67	< 0.01	0.061	0.035	0.031	0.014
	0.3	68	< 0.01	0.295	0.091	0.094	0.055
	1.0	136	0.01	0.909	0.316	0.320	0.195
Muscle	0.1	4	< 0.02	0.021	0.01	0.012	0.006
	0.3	4	0.021	0.031	0.025	0.026	0.004
	1.0	4	0.040	0.057	0.048	0.048	0.007
Liver	0.1	4	0.029	0.033	0.031	0.031	0.002
	0.3	4	0.081	0.114	0.092	0.095	0.014
	1.0	4	0.161	0.298	0.240	0.235	0.059
Fat	0.1	4	0.297	0.338	0.315	0.316	0.019
	0.3	4	0.921	1.245	1.048	1.066	0.134
	1.0	4	2.649	3.493	3.066	3.068	0.437

[a] For calculation of minimum and maximum values, the LOQs (0.01 ppm for eggs and 0.02 ppm for tissues) were used for\ residues reported as <LOQ in Table C.3. For calculation of the median, mean, and standard deviation, ½ the LOQ was used for residues below the LOQ.

The variation in metaflumizone residue in eggs as a function of study day is shown in Figure 11 for the 1 ppm feeding level group. Residues appear to have plateaued at about day 21.

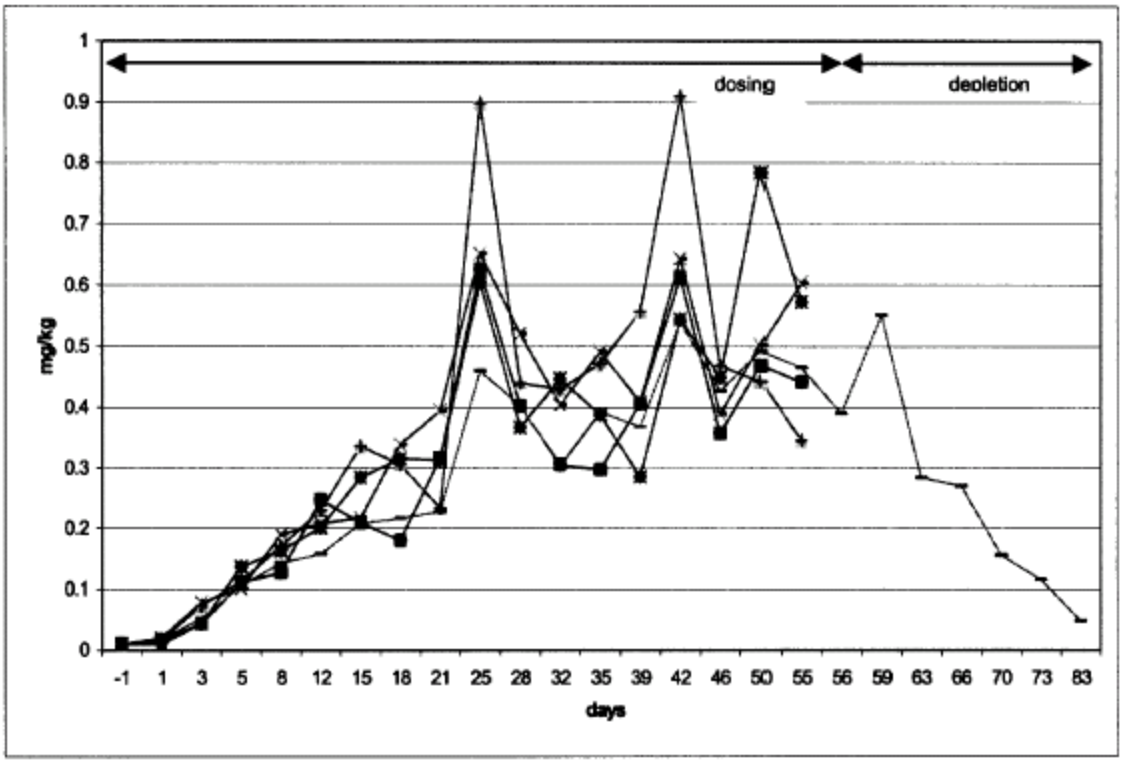


Figure 11 Total metaflumizone residues in egg from the 0.9 ppm treatment group.

Five groups of Holstein/Friesian dairy cows (3 cows per group) were dosed orally with gelatin capsules containing metaflumizone at target levels equivalent to 0.2, 1.0, 5.5, and 16.5 (two groups) ppm in the feed for 45 consecutive days (G. McLellan, 2005, Report 2004/1020819).

The overall mean daily dose levels for each animal were all within 10% of the target levels. Cows were milked twice daily, and the collected milk samples were composited daily for each cow. In addition to the above milk samples, cream and skim milk samples were also prepared from the milk of all animals at certain collection day periods. Samples of liver, kidneys, muscle, and fat were collected at sacrifice.

Milk and tissue samples were analysed using a a liquid chromatograph/mass spectrometer/mass spectrometer (LC/MS/MS) method (YAP/006/V02), which was adapted from BASF Method 528/0. This method determines residues of metaflumizone (E and Z isomers) in matrices of animal origin. The limit of quantitation (LOQ) for metaflumizone (the total for the E and Z isomers) in tissues and milk were: (i) 0.01 ppm for milk, skim milk, and cream; and (ii) 0.02 ppm for liver, kidney, muscle, and fat. The LOQ was defined by the lowest fortification level successfully tested. Liver residues not extracted with methanol are subjected to microwave extraction with acetonitrile/concentrated acetic acid. The cleaned-up extract is analysed via GC/MS for M320I28.

Results are summarized in Table 100.

Table 100 Residue data for milk and tissues collected from a ruminant feeding study with dairy cows in the USA (G. McLellan, 2005, Report 2004/1020819).

Collection Time	Residues of Combined Metaflumizone (E + Z isomers) in mg/kg by Feeding Level [a]					
	Control	0.2 ppm	1.0 ppm	5.5 ppm	16.5 ppm (Ea)	16.5 ppm (Eb)
Whole Milk						
	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Day -1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Day 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0141
	< 0.01	< 0.01	< 0.01	< 0.01	0.0102	0.0182
Day 3	< 0.01	< 0.01	< 0.01	< 0.01	0.0171	0.0192
	< 0.01	< 0.01	< 0.01	< 0.01	0.0431	0.0276
	< 0.01	< 0.01	< 0.01	< 0.01	0.0438	0.0387
Day 5	< 0.01	< 0.01	< 0.01	< 0.01	0.0664	0.0621
	< 0.01	< 0.01	< 0.01	< 0.01	0.0356	0.0334
	< 0.01	< 0.01	< 0.01	0.0168	0.0560	0.0493
Day 8	< 0.01	< 0.01	< 0.01	0.0186	0.0624	0.0696
	< 0.01	< 0.01	< 0.01	< 0.01	0.0297	0.0104
	< 0.01	< 0.01	< 0.01	0.0118	0.0306	0.0149
Day 12	< 0.01	< 0.01	< 0.01	0.0171	0.0525	0.0358
	< 0.01	< 0.01	< 0.01	< 0.01	0.0416	0.0315
	< 0.01	< 0.01	< 0.01	0.0162	0.0422	0.0409
Day 15	< 0.01	< 0.01	< 0.01	0.0219	0.0459	0.0649
	< 0.01	< 0.01	< 0.01	< 0.01	0.0454	0.0478
	< 0.01	< 0.01	< 0.01	0.0187	0.0472	0.0492
Day 18	< 0.01	< 0.01	< 0.01	0.0219	0.0627	0.0706
	< 0.01	< 0.01	< 0.01	< 0.01	0.0373	0.0360
	< 0.01	< 0.01	< 0.01	0.0149	0.0463	0.0390
Day 21	< 0.01	< 0.01	< 0.01	0.0286	0.0509	0.0583
	< 0.01	< 0.01	< 0.01	< 0.01	0.0439	0.0471
	< 0.01	< 0.01	< 0.01	0.0186	0.0454	0.0520
Day 25	< 0.01	< 0.01	< 0.01	0.0226	0.0585	0.0657
	< 0.01	< 0.01	< 0.01	< 0.01	0.0443	0.0394
	< 0.01	< 0.01	< 0.01	0.0119	0.0444	0.0486
Day 28	< 0.01	< 0.01	< 0.01	0.0172	0.0633	0.0830
	< 0.01	< 0.01	< 0.01	< 0.01	0.0474	0.0491
	< 0.01	< 0.01	< 0.01	0.0207	0.0518	0.0610
Day 32	< 0.01	< 0.01	< 0.01	0.0216	0.0536	0.0669
	< 0.01	< 0.01	< 0.01	< 0.01	0.0192	0.0189
	< 0.01	< 0.01	< 0.01	< 0.01	0.0343	0.0430
Day 36	< 0.01	< 0.01	< 0.01	< 0.01	0.0420	0.0668

Collection Time	Residues of Combined Metaflumizone (E + Z isomers) in mg/kg by Feeding Level [a]					
	Control	0.2 ppm	1.0 ppm	5.5 ppm	16.5 ppm (Ea)	16.5 ppm (Eb)
Day 40	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 0.0100 0.0169	0.0372 0.0407 0.0695	0.0314 0.0337 0.0691
Day 42	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 0.0107 0.0197	0.0380 0.0396 0.0624	0.0385 0.0558 0.0734
Day 45	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 0.0125 0.0181	0.0435 0.0492 0.0667	0.0413 0.0466 0.0832
Day 1 Post Last Dose						0.0367 0.0443 0.0766
Day 3 Post Last Dose						0.0137 0.0246 0.0268
Day 7 Post Last Dose						< 0.01 0.0119 0.0183
Day 12 Post Last Dose						< 0.01 < 0.01
Day 18 Post Last Dose						< 0.01
Day 21 Post Last Dose						< 0.01
Skim milk						
Day 40	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01
Day 3 Post Last Dose						< 0.01 < 0.01 < 0.01
Day 12 Post Last Dose						< 0.01 < 0.01
Day 21 Post Last Dose						< 0.01
Cream						
Day 40	< 0.01 < 0.01 < 0.01	< 0.01 < 0.01 < 0.01	0.0468 0.0473 0.0519	0.103 0.117 0.242	0.630 0.637 0.669	0.638 0.678 0.883
Day 3 Post Last Dose						0.176 0.204 0.324

Collection Time	Residues of Combined Metaflumizone (E + Z isomers) in mg/kg by Feeding Level [a]					
	Control	0.2 ppm	1.0 ppm	5.5 ppm	16.5 ppm (Ea)	16.5 ppm (Eb)
Day 12 Post Last Dose						0.0707 0.0960
Day 21 Post Last Dose						0.0671
Liver (metaflumizone (E and Z isomers)						
Day 46	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	0.0255 0.0409 0.0586	
Day 7 Post Last Dose						< 0.02
Day 14 Post Last Dose						< 0.02
Day 21 Post Last Dose						< 0.02
Liver (Residues of M320I28 in the Nonextractable Residues) [b]						
Day 46	< 0.05 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05	< 0.05 < 0.05 < 0.05	< 0.05 0.061 < 0.05	0.130 0.133 0..131	
Day 7 Post Last Dose						< 0.05
Day 14 Post Last Dose						0.069
Day 21 Post Last Dose						< 0.05
Kidney						
Day 46	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	0.0326 0.0416 0.0531	
Day 7 Post Last Dose						< 0.02
Day 14 Post Last Dose						< 0.02
Day 21 Post Last Dose						< 0.02
Muscle						
Day 46	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 0.0508 0.0625	
Day 7 Post Last Dose						< 0.02
Day 14 Post Last						< 0.02

Collection Time	Residues of Combined Metaflumizone (E + Z isomers) in mg/kg by Feeding Level [a]					
	Control	0.2 ppm	1.0 ppm	5.5 ppm	16.5 ppm (Ea)	16.5 ppm (Eb)
Dose						
Day 21 Post Last Dose						< 0.02
Fat						
Day 46	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	< 0.02 0.0191 0.0429	0.115 0.163 0.182	0.386 0.447 0.864	
Day 7 Post Last Dose						0.332
Day 14 Post Last Dose						0.126
Day 21 Post Last Dose						0.0900

[a] The LOQs for combined E and Z isomers are: (i) 0.010 ppm for milk, skim milk, and cream; and (ii) 0.020 ppm for tissues.

[b] only liver post extraction solid were analysed for residues of M320I28 (microwave digestion).

An overall summary is given in Table 101.

Table 101 Summary of milk and tissue residue data from a cattle feeding study with metaflumizone (G. McLellan, 2005, Report 2004/1020819)

Matrix	Feeding Level Group (ppm)	Residue Levels of Combined Metaflumizone (E + Z Isomers) in ppm [a]					
		n	Min.	Max.	Median	Mean	Std. Dev.
Milk	0.2	45	< 0.01	< 0.01	0.005	0.005	--
	1.0	45	< 0.01	< 0.01	0.005	0.005	--
	5.5	45	< 0.01	0.0286	0.005	0.0112	0.007
	16.5 (E(a))	45	< 0.01	0.0695	0.0439	0.0418	0.017
	16.5 (E(b))	3	< 0.01	0.0832	0.0430	0.0436	0.021
Skim milk	0.2	3	< 0.01	< 0.01	0.005	0.005	--
	1.0	3	< 0.01	< 0.01	0.005	0.005	--
	5.5	3	< 0.01	< 0.01	0.005	0.005	--
	16.5 (E(a))	3	< 0.01	< 0.01	0.005	0.005	--
	16.5 (E(b))	3	< 0.01	< 0.01	0.005	0.005	--
Cream	0.2	3	< 0.01	< 0.01	0.005	0.005	--
	1.0	3	0.0468	0.0519	0.0473	0.0487	0.003
	5.5	3	0.103	0.242	0.117	0.154	0.077
	16.5 (E(a))	3	0.630	0.669	0.637	0.6453	0.021
	16.5 (E(b))	3	0.638	0.883	0.678	0.733	0.131
Liver (extractable metaflumizone (E and Z isomers))	0.2	3	< 0.02	< 0.02	0.01	0.01	--
	1.0	3	< 0.02	< 0.02	0.01	0.01	--
	5.5	3	< 0.02	< 0.02	0.01	0.01	--
	16.5 (E(a))	3	0.0255	0.0586	0.0409	0.0417	0.017
	16.5 (E(b))	3	< 0.02	< 0.02	0.01	0.01	--

Matrix	Feeding Level Group (ppm)	Residue Levels of Combined Metaflumizone (E + Z Isomers) in ppm [a]					
		n	Min.	Max.	Median	Mean	Std. Dev.
Liver (M320I28 in post extraction solids; residues expressed in parent equivalents)	0.2	3	< 0.115	< 0.115	0.058	0.058	--
	1.0	3	< 0.115	< 0.115	0.058	0.058	--
	5.5	3	< 0.115	0.141	0.086	0.058	0.048
	16.5 (E(a))	3	0.300	0.308	0.212	0.300	0.157
	16.5 (E(b))	3	< 0.115	0.159	0.092	0.058	0.058
Kidney	0.2	3	< 0.02	< 0.02	0.01	0.01	--
	1.0	3	< 0.02	< 0.02	0.01	0.01	--
	5.5	3	< 0.02	< 0.02	0.01	0.01	--
	16.5 (E(a))	3	0.0326	0.0531	0.0416	0.0424	0.010
	16.5 (E(b))	3	< 0.02	< 0.02	0.01	0.01	--
Muscle	0.2	3	< 0.02	< 0.02	0.01	0.01	--
	1.0	3	< 0.02	< 0.02	0.01	0.01	--
	5.5	3	< 0.02	< 0.02	0.01	0.01	--
	16.5 (E(a))	3	< 0.02	0.0625	0.0508	0.0411	0.028
	16.5 (E(b))	3	< 0.02	< 0.02	0.01	0.01	--
Fat	0.2	3	< 0.02	< 0.02	0.01	0.01	--
	1.0	3	< 0.02	0.0429	0.0191	0.024	0.017
	5.5	3	0.115	0.182	0.163	0.1533	0.034
	16.5 (E(a))	3	0.386	0.864	0.447	0.566	0.260
	16.5 (E(b))	3	0.0900	0.332	0.126	0.1827	0.131

[a] For calculation of minimum and maximum values, the LOQs [(i) 0.010 ppm for milk, skim milk, and cream; and (ii) 0.020 ppm for tissues] were used for residues reported as < LOQ in Table C.3. For calculation of the median, mean, and standard deviation, ½ the LOQ was used for residues reported below the LOQ.

Metaflumizone (BAS 320I) residues in milk were quantifiable only in the 5.5 ppm (Grp D) and 16.5 ppm (Grp E)feeding level samples. Residues in while milk appeared to plateau early (day 7) and remain rather constant, see Figure 12.

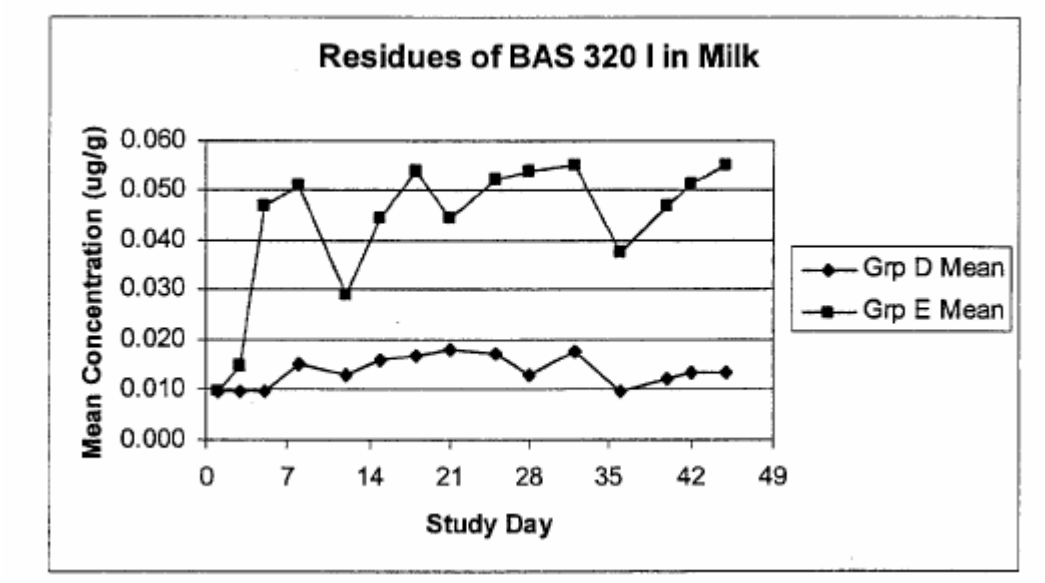
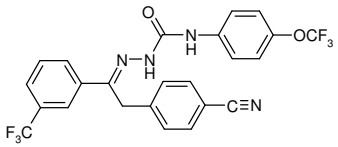


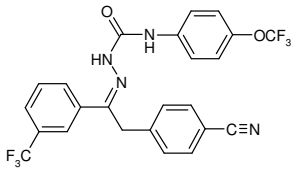
Figure 12 Milk Residues as a Function of Time

APPRAISAL

The insecticide metaflumizone is a broad-spectrum semicarbazone composed of two optical isomers in the ratio E:Z of 90:10 and was considered for the first time by the JMPR.



E-isomer



Z-isomer

The manufacturer submitted studies on physical and chemical properties, animal and plant metabolism, environmental fate in soil, rotational crops, analytical methods, freezer storage stability, use patterns, supervised field trials on plants, processing and residues in animal commodities.

List of metabolites and degradation products

M3210I04	4-{2-oxo-2-[3-(trifluoromethyl)phenyl]ethyl}benzonitrile
M3210I05	trifluoromethoxy aniline
M3210I06	4-cyanobenzoic acid
M3210I07	(EZ)-2-{2-(4-cyanophenyl)-2-hydroxy-1-[3-(trifluoromethylphenyl]ethylidene}-N-[4-(trifluoromethoxy)- phenyl]hydrazinecarboxamide
M3210I08	N-[4-(trifluoromethoxy) phenyl]hydrazinecarboxamide
M3210I09	4-{(2E)-2-hydrazono-2-[3-(trifluoromethyl)phenyl]ethyl} benzonitrile
M3210I10	(2S,3S,4S,5R,6R)-6-[2-(4-cyano-phenyl)-1-(3-trifluoromethyl-phenyl)-ethoxy]-3,4,5-trihydroxy-tetrahydro-pyran-2-carboxylic acid
M3210I13	glycine conjugate of M3210I06
M3210I22	metaflumizone hydroxylated at the 3-fluoromethoxyphenyl ring
M3210I23	4-{5-hydroxy-3-oxo-4-[4-(trifluoromethoxy)phenyl]-6-[3-(trifluoromethyl)phenyl]-2,3,4,5-tetrahydro-1,2,4-triazin-5-yl}benzonitrile
M3210I24	glucuronic acid conjugate of M3210I22
M3210I25	4-{2-hydroxy-2-[3-(trifluoromethyl) phenyl]ethyl}benzonitrile
M3210I26	2-amino-pentanedioic acid 1-[2-(4-cyano-phenyl)-1-(3-trifluoromethyl-phenyl)-ethyl]ester
M3210I27	metaflumizone hydroxylated at the 3-fluoromethylphenyl ring
M3210I28	N-[4-(trifluoromethoxy) phenyl]acetamide
M3210I29	m-trifluoromethyl benzoic acid

Animal metabolism

The Meeting received animal metabolism studies with metaflumizone in rats, lactating goats and laying hens. The metabolism and distribution of metaflumizone in animals was investigated using the trifluoromethoxyphenyl-U-[^{14}C] and benzonitrile-U-[^{14}C]-labelled compound, referred as T- and B-label.

Metaflumizone was found to be metabolised in the rat *via* hydroxylation of the aniline ring or benzonitrile ring and hydrolysis of the central hydrazine carboxamide group to yield the aniline and phenacylbenzoylnitrile derivatives. The trifluoromethoxyaniline group was shown to conjugate with malonic and oxalic acids. Ring hydroxylated derivatives of metaflumizone were readily conjugated with sulphate or glucuronic acid. Glycine conjugation occurred at the carboxyl group of the cyanobenzoic acid, whereas glutathione conjugation occurred by displacement of one of the fluorine atoms of the trifluoromethyl or trifluoromethoxy groups. Analysis of tissues after a single oral dose revealed that the major residue was unchanged metaflumizone. Evaluation of residues in adipose

tissue following repeated dosing demonstrated that unchanged metaflumizone was the only significant residue.

When lactating goats received a nominal oral dose of 12 ppm of [^{14}C]metaflumizone for 14 consecutive days in the feed, most of the absorbed radioactive material was excreted through the faeces (66–79%). About 2.5–5% of the initial dose was excreted via urine. Milk accounted for 0.87–1.47% of the initial radioactive dose, though the radioactive concentration in milk increased throughout the application period. TRR were 0.2 mg/kg in milk, 1.3 mg/kg in liver, 0.21 mg/kg in kidney, 0.068 mg/kg in muscle, and 0.73 mg/kg in fat from goats dosed orally with T-label [^{14}C]metaflumizone. TRR were 0.53 mg/kg in milk, 2.8 mg/kg in liver, 0.38 mg/kg in kidney, 0.18 mg/kg in muscle, and 2.9 mg/kg in fat from goats dosed orally with B-label [^{14}C]metaflumizone. Metaflumizone (sum of E- and Z-isomers) were found to be the major residue in all matrices, with 31-108% TRR (highest level at 3.1 mg/kg in fat). The metabolites M320I04, M320I07, M320I13, M320I23, M320I24, M320I25 and M320I26 were identified in liver. Furthermore, the non-extracted residues of liver (T-label) could be converted into the hydrolysis product M320I28 after mixing with acetonitrile and acetic acid and treated by micro-wave for 30 minutes at 150 °C. M320I24 was identified in kidney.

Metabolism of metaflumizone in goats followed two different paths. One route was cleavage of the molecule at the imine-bridge resulting in the formation of M320I04 and the trifluoromethoxyaniline (M320I05). M320I04 was cleaved, oxidized and conjugated with glycine to M320I13 or reduced and conjugated with glucuronic acid (M320I10) or glutamic acid (M320I26). The main route involved hydroxylation of the parent compound at the trifluoromethoxyaniline ring, followed by conjugation to glucuronic acid. The hydroxylation at the benzyl-position of the molecule was followed by oxidation and ring formation to M320I23. In extracts of edible portions of the goat the parent compound is the main residue.

After 14 consecutive daily oral administrations of [^{14}C]metaflumizone at nominal dose level of 12 ppm feed to laying hens, considerable retention in organs and tissues, especially in adipose tissue, was measured. Depending on the label used, radioactivity in eggs amounted to 5.75–6.35% of the total radioactivity administered. The relevant residue in organic extracts of egg, liver, muscle and fat was the parent compound with 56–106% TRR (highest level at 28 mg/kg in fat) in extractable fractions. The metabolite M320I04 was found in minor portions (1.5% TRR, 0.042 mg/kg) in extracts of egg and excreta (B-label). Additionally, considerable amounts of the hydroxylated metabolite M320I27 were detected in excreta. The metabolites M320I25 and M320I26 were identified in liver.

Furthermore, the non-extracted residues of liver could be converted into the detectable hydrolysis products M320I28 for T-label and M320I04 for B-label after mixing with acetonitrile and acetic acid and treated by micro-wave for 30 minutes at 150 °C.

The active substance was metabolized in hens via two routes: the cleavage of the molecule at the imine-bridge resulted in the formation of M320I04, which was further converted to M320I25 and M320I26. The hydroxylation of the parent compound at the 3-trifluoro-methylphenyl moiety resulted in the formation of the metabolite M320I27. In edible portions of poultry the parent compound is the main residue.

In summary, the metabolic pathways in rats, goats and poultry were generally similar. Metaflumizone is metabolized in livestock *via* the following reactions:

- hydroxylation at the 3-trifluoromethylphenyl ring forming M320I27
- hydroxylation at the trifluoromethoxyaniline ring forming M320I22 followed by conjugation to glucuronic acid to form M320I24
- hydroxylation of metaflumizone at the benzyl position to form M320I07 followed by oxidation and ring formation yielding M320I23
- cleavage at the imine bridge, resulting in the formation of M320I04 and a metabolite containing the trifluoromethoxyaniline moiety

– cleavage of M320I04 to form M320I06 which is conjugated with glycine to form M320I13; and/or reduction of M320I04 to form M320I25 which is conjugated with glucuronic acid to form M320I10 or conjugated with glutamic acid to form M320I26.

In edible portions the parent compound is the main residue.

Plant metabolism

Plant metabolism studies were performed on white cabbage (sampling at 0, 3 and 7 days PHI), tomato (sampling at 0 and 7 days PHI) and cotton (sampling at 21 days PHI) using the benzonitrile- and trifluoromethoxyphenyl-U-[^{14}C]labelled metaflumizone (B- and T-label). The cabbage study was conducted at 4 × 0.28 kg ai/ha. The rates of application for the cotton and the tomato study (under both field and glasshouse conditions) were 6 × 0.34 kg ai/ha.

In cabbage, TRR were 11.7, 11.2, and 10.0 mg/kg in cabbage leaves harvested 0, 3, and 7 days, respectively, following application of B-label metaflumizone, and 12.4, 11.8, and 11.3 mg/kg in cabbage leaves harvested 0, 3, and 7 days, respectively, following application of T-label metaflumizone. The E- and Z-isomers of metaflumizone were the major identified residues in both B- and T-label cabbage. The E-isomer constituted 60–81% TRR and the Z-isomer 6–18% TRR at 3 or 7 days PHI. The E:Z isomer ratio decreased from the 3 to the 7 day sampling interval. Metabolite M320I04 was also a significant residue identified in B-label cabbage (up to 16% TRR, 2.1 mg/kg). Two additional metabolites, M320I07 and M320I23, were identified as minor residues in cabbage (both labels, maximum of 3.2% TRR).

In tomatoes, TRR were found at up to 0.6 mg/kg for the field (0 day PHI) and 0.78 mg/kg for the glasshouse (0 day PHI). At day 7, residues up to 0.52 mg/kg were found. In field-grown tomatoes, the E- and Z-isomers of metaflumizone were the major identified residues in tomatoes from both labels and both sampling intervals.

In field grown B-label tomatoes, the E- and Z-isomers of metaflumizone, respectively, accounted for 29% TRR (0.17 mg/kg) and 34% TRR (0.20 mg/kg) in the 0 day PHI samples, and in samples from a 7 day PHI 25% TRR (0.083 mg/kg) and 35% TRR (0.12 mg/kg). In T-label tomatoes, the E- and Z-isomers, respectively, accounted for 35% TRR (0.14 mg/kg) and 44% TRR (0.18 mg/kg) from 0 days PHI samples, and 32% TRR (0.096 mg/kg) and 49% TRR (0.15 mg/kg) from 7 day PHI samples. Metabolite M320I04 was also a residue in B-label tomatoes at 12% TRR (0.04–0.08 mg/kg). Two additional metabolites were identified: M320I23 at 2.7–3.6% TRR (0.01–0.02 mg/kg) in B- and T-label samples, and M320I06 at < 1% TRR (0.003–0.004 mg/kg) in B-label samples.

The E- and Z-isomers of metaflumizone were also the major identified residues in tomatoes grown under protected cropping conditions (green-house) from both labels and both sampling intervals. In B-label tomatoes, the E- and Z-isomers, respectively, accounted for 44% TRR (0.35 mg/kg) and 29% TRR (0.22 mg/kg) in samples from a 0 day PHI, and 32% TRR (0.17 mg/kg) and 40% TRR (0.21mg/kg) in 7 day PHI samples. In T-label tomatoes, the E- and Z-isomers, respectively, accounted for 47%TRR (0.18 mg/kg) and 37% TRR (0.14 mg/kg) in samples from the 0 day PHI, and 38% TRR (0.11 mg/kg) and 45% TRR (0.13 mg/kg) from the 7 day PHI. Metabolite M320I04 was also a residue in B-label tomatoes at 11.5–15.7% TRR (0.06–0.12 mg/kg). Two additional metabolites were identified: M320I23 at 1–3% TRR (0.007–0.011 mg/kg) in B- and T-label samples, and M320I06 at < 1% TRR (0.003–0.005 mg/kg) in B-label samples.

In cotton seed, TRR were up to 0.37 mg/kg of which 56–64% of them were identified. The E- and Z-isomers of metaflumizone and metabolite M320I04 were the major identified residues, with the E- and Z-isomers accounting for 16.8% TRR (0.063 mg/kg) and 16.9% TRR (0.063 mg/kg), respectively, in B-label cotton seed, and 20.8% TRR (0.029 mg/kg) and 25.6% TRR (0.036 mg/kg), respectively, in T-label cotton seed; metabolite M320I04 was identified at 16.6% TRR (0.059 mg/kg) in B-label cotton seed. Three additional metabolites were identified in cotton seed: M320I23 at 7.1% TRR (0.026 mg/kg) and 8.4% TRR (0.011 mg/kg) in B- and T-label cotton seed, M320I06 at 6.4% TRR (0.024 mg/kg) in B-label cotton seed, and M320I05 at 1.5% TRR (0.002 mg/kg) in T-label cotton seed.

Total radioactive residues were up to 29 mg/kg in cotton gin by-products. The E- and Z-isomers of metaflumizone were the major identified residues, accounting for 19% TRR (5.58 mg/kg) and 29% TRR (8.50 mg/kg), respectively, in B-label gin by-products, and for 26% TRR (4.97 mg/kg) and 38.9% TRR (7.49 mg/kg), respectively, in T-label gin by-products. Three additional metabolites were identified in cotton gin by-products: M320I23 at 6.4% TRR (1.9 mg/kg) and 8.3% TRR (1.6 mg/kg) in B- and T-label samples, and M320I04 and M320I06 at 13.1% TRR (3.83 mg/kg) and 7.2% TRR (2.11 mg/kg) in B-label samples.

In the plant metabolism studies on cabbage, tomato and cotton, the same metabolic pathway was observed. In all plant metabolism studies the parent compound metaflumizone was identified as the most prominent component (E- and Z-isomers; 34–98% TRR; E:Z ratio of about 1:1 to 12:1). The major degradation product is M320I04, accounting for 12–17% of TRR. The cyclic derivative M320I23, arising from M320I07 by ring closure, was detected in concentrations < 10% of TRR in all three plant metabolism studies. M320I07 was found in low amounts (2–3% of TRR) only in cabbage samples. Metabolite M320I05 also formed by cleavage of the parent compound is only found in cotton seed in low amounts, accounting for 1.5% of TRR. Metabolite M320I06 is formed by cleavage of M320I04. This metabolite accounted for 7% of the TRR in cotton seed and < 1% in tomato samples. Based on these data, it appears that metaflumizone is metabolized in plants *via* the following reactions:

- isomerisation of the metaflumizone E-isomer to the Z-isomer,
- cleavage of the parent molecule to form M320I04,
- ring closure to form metabolite M320I23,
- cleavage of M320I23 to form M320I05
- cleavage of M320I23 and/or M320I04 to form M320I06.

Environmental fate in soil

Aerobic degradation

Two studies were carried out to investigate the degradation of metaflumizone under aerobic conditions. In the first study benzonitrile- and trifluoromethoxyphenyl-U-[^{14}C]labelled metaflumizone (B- and T-label) was used. Metaflumizone degraded and mineralized in soil with a DT_{50} of 186–209 days. CO_2 (8–29% of total applied radioactivity) and non extracted residues (21–38% of total applied radioactivity) were the major degradation products. Several metabolites were observed, but only metabolite M320I23 exceeded 5% of total applied radioactivity, showing maximum amounts of 7–8% of total applied radioactivity during the incubation period.

In the second study the [^{14}C]trifluoromethylphenyl-labelled compound was used to get information on the fate of the third ring system of the metaflumizone molecule. The results show that the parent is slowly degraded in soil with half-lives of 202, 328, and 423 days for the three tested soils, respectively. In all three soils numerous minor metabolites appeared during the course to the study. However, all metabolites detected were formed only in very small amounts and none exceeded 3.8% of the applied radioactivity. The mineralization rate reached 2–15% of the applied radioactivity after 122 days of incubation, whereas the non-extracted residues amounted to 6–13% of the applied radioactivity at the end of the study.

The degradation of metaflumizone in soil is characterized by a breakdown of the molecule leading to several intermediate products representing the various aromatic ring moieties of the parent compound. In all tested soils, in principle the same routes of degradation are followed. Metaflumizone can be oxidized at the benzyl group between the trifluoromethylphenyl ring and the benzonitrile ring (M320I07), which further leads to the cyclic product (M320I23). Metaflumizone can also split up into two moieties, one representing the trifluoromethoxyphenyl ring (M320I08 or M320I05), the other one

still consisting of benzonitrile and trifluoromethylphenyl ring (M320I09 or M320I04). The two aromatic rings in metabolites M320I09 and M320I04 can be split up forming the single ring structures M320I29 (trifluoromethyl benzoic acid) and M320I06 (cyano benzoic acid). All intermediates are further degradable to finally form CO_2 and non-extracted residues.

Rotational crops

A field-based rotational crop study was not conducted. Two confined rotational crop metabolism studies were undertaken to consider the uptake of residues in rotational crops. Both studies were conducted using B- and T-label [^{14}C]metaflumizone applied to bare soil. The first study involved considering a range of replanting intervals, where rotational lettuce, radish, and spring wheat were planted 30, 60/62, 120, and 365 days after treatment. The application rate of the first study was 2 × 0.56 kg ai/ha/application (20 days between applications). The second study involved a 30 days replant interval only, and a single application of 1.2 kg ai/ha, and again lettuce, radish and spring wheat were planted.

For all plant back intervals (PBI) of the first study, the residue levels in lettuce leaf were very low and remained at the same level (• 0.01 mg/kg). The concentration of TRR in radish leaves and roots were only slightly higher (max. 0.036 mg/kg) than in lettuce and declined with subsequent plant back periods. In the wheat matrices hay and grain the initial TRR values were clearly higher, with highest values in wheat hay of 0.67 mg/kg and in grain of 0.17 mg/kg, but they also declined with longer PBI. In wheat straw, the initial TRR (0.11–0.14 mg/kg) were higher than in lettuce, radish and wheat forage at a PBI of 30 days. The TRR in straw increased in the 60 day PBI (0.24–0.27 mg/kg) and declined again in the samples at 120 (0.11–0.12 mg/kg) and 365 PBI (0.04-0.05 mg/kg).There were no major differences in radioactivity levels between the two labels.

In the second rotational crop metabolism study, TRR were comparable in both labels, with the exception of wheat straw and grain, where the B-label showed higher residues. The TRR in lettuce leaf were low (0.02 mg/kg) and had a range similar to radish roots (0.01 mg/kg), but were slightly higher in radish leaves (0.04 mg/kg). In wheat matrices, residues were generally higher than in other matrices with highest values in wheat hay (0.8 mg/kg). In grain and straw, TRR of 0.04 and 0.1 mg/kg were found. The extractability of the different matrices (with the exception of grain) had a range of 54–95% TRR. In grain samples only 11–15% of TRR was extractable.

In the second study, HPLC analysis of the methanol extracts showed that the unchanged parent compound was present in all matrices (with the exception of wheat grain) as a minor component of the radioactive residue with levels of < 0.001–0.015 mg/kg. In radish roots and wheat grain, the radioactivity was mainly in the polar region. In all other matrices, the metabolite patterns of the methanol extracts were quantitatively comparable. The radioactivity was divided into a range of peaks, mainly in the polar and medium polar fraction. M320I04 and M320I06 could be identified as minor components in the radioactive residues. HPLC analysis of all other extractable radioactive residues showed that these split up in a variety of polar and medium polar peaks that can all be considered as minor. Bound residues that could be released by treatments with aqueous ammonia solution, NaOH and different enzymes also split up in various fractions with TRR at a maximum level of 0.014 mg/kg.

The data submitted on rotational crop metabolism suggest there are no residues of significance that are expected to arise in crops planted in the rotation following primary crop use of metaflumizone according to GAP. Besides the parent, two other metabolites, M320I04 and M320I06, could be detected in low levels (< 5% TRR).

Environmental fate in water-sediment systems

Hydrolysis

In the hydrolysis study with [^{14}C]metaflumizone conducted using sterile buffer solutions at 25 °C, the hydrolytic half-lives were found to be about 6 days at pH 4 and about 27–31 days at pH 5. No

degradation of metaflumizone occurred in the pH 7 and pH 9 buffer solutions. At pH 4 and pH 5, the hydrolysis products M320I04 and M320I08 were identified, reaching maximum amounts of up to 90% and 68% TAR, respectively. A number of minor unidentified components were also detected (individually mostly < 5%).

Photolysis

The results showed that metaflumizone is extensively degraded in water under photolytic conditions. A DT_{50} value of 2–3 days of continuous irradiation was calculated. Isomerisation of the metaflumizone E-isomer to the Z-isomer occurred. There were several major and minor photoproducts appearing in the water phase identified as M320I04, M320I06, M320I09, and M320I08, representing the different ring moieties of the parent after cleavage of the molecule. One degradation product, M320I05, proved to be volatile and was trapped in the ethylene glycol trapping solution. Additionally, numerous minor non-identified photoproducts (n > 50) were formed. With both B- and T-label it was shown that even under sterile conditions, metaflumizone was completely degraded forming finally CO_2.

Methods of analysis

Metaflumizone and its metabolites M320I04 and M320I23 are extracted from the following plant matrices; white cabbage, tomato, cotton seed, lettuce, potato tuber, lemon, gin trash, wheat grain and potato crisps using a mixture of methanol and water. For clean-up a liquid/liquid partition against dichloromethane was used. The final determination of metaflumizone, M320I04 and M320I23 was performed by HPLC-MS/MS. For cotton seed no clean-up was done.

The LC-MS/MS method of analysis for a range of plant products was acceptably validated as method 531/0 over the concentration range of 0.01 to 0.1 mg/kg. Independent laboratory validation (ILV) data were available as method 531/1 and the individual recoveries were all within a good range.

The LC-MS/MS method of analysis of metaflumizone (E- and Z-isomer) for animal products as muscle (bovine, hen), liver (bovine, hen), kidney (bovine) and fat (bovine) together with intra-laboratory validation was acceptably validated as method 528/0 over the concentration range 0.01 to 0.20 mg/kg. The methods for the determination of metaflumizone (E- and Z-isomer) in bovine milk and hen eggs were validated over the concentration range 0.005 to 0.10 mg/kg.

In general, for residues methods of analyses in plants and animal products, the following criteria were fulfilled:

- adequate limit of quantification
- mean recovery 70–110%
- relative standard deviation of recovery rates < 20%
- interfering blanks lower than 30% of the limit of quantification

The GC-MS multiresidue method DFG method S19 was tested for both the E- and the Z-isomer and was found not to be applicable to the analysis of metaflumizone.

Stability of residues in stored analytical samples

The Meeting received information on the storage stability of residues in extracts available from metabolism studies, in fortified samples and incurred residues.

Extracts available from metabolism studies in lactating goats, laying hens, white cabbage and tomatoes were used to estimate the stability of [^{14}C]metaflumizone residues in stored analytical samples. It was shown, that the chromatographic pattern of the stored extract was comparable with the pattern of the first extract. It can be concluded that residues are stable in methanol extracts of animal

matrices (eggs, milk, liver, kidney, muscle and fat) and in plant matrices (methanol extracts of white cabbage, acetonitrile extracts of tomato) for at least 18 and 12 months, respectively.

The Meeting received information on the stability of metaflumizone E- and Z-isomer, M320I04 and M320I23 in fortification experiments on tomato, cotton seed, potato, white cabbage and lettuce at –20 °C in the dark.

Both isomers of the parent were stable for up to two years in potato tuber, white cabbage and lettuce. Storage stability for one year was demonstrated for the metaflumizone E-isomer in tomato and the E- and Z-isomer in cotton seed. The metaflumizone Z-isomer was unstable in tomatoes stored for greater than 28 days.

For the metabolite M320I04, freezer storage stability was adequately demonstrated in tomato and cotton seed but not in potato, white cabbage and lettuce. The calculation of the 70% stability for potato, white cabbage and lettuce gave results of 23, 15 and 2 days respectively.

For the metabolite M320I23, freezer storage stability was adequately demonstrated in tomato, cotton seed, potato, white cabbage and lettuce for one year.

Incurred residues of the E-isomer of metaflumizone were stable at –20 °C in the dark in tomatoes, cabbage, broccoli, lettuce, celery and mustard greens for at least one year. The metaflumizone Z-isomer was stable in cabbage, broccoli, lettuce, celery and mustard greens for at least 290 days. In tomatoes there was a loss of the parent Z-isomer, but an increase in concentration of M320I04 was noted, indicating a possible degradation of parent to M320I04.

Definition of the residue

Plants

The main residues found in the crop metabolism studies are the E- and Z-isomers of metaflumizone. In tomatoes, the metabolite M320I04 constituted up to 16%TRR in the fruit. This metabolite was also found in cotton seed and cabbage at up to 17% of TRR. Other metabolites were found in lower amounts, e.g., M320I23 was found at up to 8% TRR in the cotton study, up to 4% TRR in tomatoes, and up to 1% TRR in cabbage.

In metabolism studies and residues trials, where positive residues were found, evidence of isomerisation from the E- to the Z-isomer was shown. As a consequence both isomers should be included into the residue definition.

The metabolite M320I23 was not identified in the rat metabolism study done with metaflumizone. A separate toxicity study of metabolite M320I23 shows that it is of lower toxicity than the parent. Residues of M320I23 were consistently absent in supervised residue trials but were found in the outer leaves of cabbage at 0.02 to 0.06 mg/kg. This is about 0.5% of the applied concentration of metaflumizone. Because of its general absence, it was concluded that this component does not need to be accommodated in the residue definition.

The metabolite M320I04 was identified in the rat metabolism study done with metaflumizone and its toxicity is covered by the derived ADI. Storage stability studies with incurred metaflumizone residues indicate that the concentration of M320I04 may increase during freezer storage, but the concentrations were at low levels. M320I04 was not detected in most of the supervised residue trials. However, in processing studies on tomatoes it was found in juice, purée, paste and wet pomace in equal or higher concentrations than the parent. Based on the very low or non-detectable residues of M320I04 in samples of supervised residue trials, this component does not need to be taken into account in the residue definition for enforcement and dietary risk assessment. However, the Meeting was aware, that the metabolite M320I04 may arise in processed products from acidic raw agricultural commodities in concentrations that may be of interest for dietary intake estimation. This should be taken into account for future uses.

Animals

The main residues found in the farm animal metabolism studies are the E- and Z-isomers of metaflumizone. Both isomers should be included into the residue definition.

The component that was identified in liver hydrolysates in the highest amount was M320I28 at 9% TRR (0.11 mg/kg) for goat and 18% TRR (0.66 mg/kg) for hen. As this component was only built under strong hydrolysis its inclusion in the residue definition was considered unnecessary.

The octanol/water coefficient (log P_{ow}) of 4.4 for the Z-isomer and 5.1 for the E-isomer, and the distribution of residues between muscle and fat in metabolism studies indicate that the residue is fat soluble.

The Meeting recommended the following residue definition:

Definition of the residue 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.

Results of supervised residue trials on crops

The Meeting received supervised trials data for the foliar application of metaflumizone as a suspension concentrate formulation (SC) to a variety of fruit, and vegetable crops. The Meeting also received supervised trials data for the application of a granular bait (GB) formulation to the soil of citrus orchards, grape vineyards, and tree nut orchards.

The NAFTA calculator was used as a tool in the estimation of maximum residue levels from the selected residue data set obtained from trials conducted according to GAP. As a first step, the Meeting reviewed all relevant factors related to each data set in arriving at a best estimate of the maximum residue level. Then, the NAFTA calculator was employed. If the statistical calculation spreadsheet suggested a different value from that recommended by the JMPR, a brief explanation of the deviation was supplied. Some common factors that may lead to rejection of the statistical estimate include when the number of data points in a data set is < 15 or when there are a large number of values < LOQ.

Citrus

Trials from the USA on grapefruit, lemons, and oranges were reported for soil treatment using a granular formulation to control fire ants. However, the GAP/label had not been approved by the national authority as of the time of the current Meeting. As there was no GAP provided to support the trials, the Meeting could not estimate a maximum residue level for citrus.

Berries and Other Small Fruits

Trials from the USA on grapes were reported for the application to the soil of a granular formulation. However, the GAP/label had not been approved by the national authority as at the time of the current Meeting. As there was no approved GAP provided to support the trials, the Meeting could not estimate a maximum residue level for berries and other small fruits.

Brassica Vegetables

Trials for the foliar application of an SC formulation of metaflumizone to head cabbage were reported for the USA, Japan, Germany, Denmark, Spain, France, United Kingdom, Greece, Sweden, and China. The proposed GAP has been withdrawn in the USA.

No label was presented for Japan, and the trials are evaluated against the GAP of Taiwan (3 × 0.029 kg as/hL, SC, 9 day PHI). The ranked order of residues from the Japan trials (n = 4) were: 0.19, 0.20, 0.21, 0.25 mg/kg.

The GAP was made available for use on cabbage for Italy (2 × 0.24 kg ai/ha or 2 × 0.024 kg as/hL, SC, 3 day PHI) and Macedonia (4 × 0.24 kg ai/ha or 4× 0.06 kg as/hL, SC, PHI not specified). Using the GAP of Italy, the ranked order of residues in the southern European trials (n = 4) were: < 0.02 (2), 0.05, 0.06 mg/kg. The ranked order of residues in the northern European trials (n = 8) were: < 0.02 (2), 0.04, 0.06, 0.08, 0.15, 0.39, 0.48 mg/kg. The trials from the North and the South do not appear to be from the same populations and should not be combined. Four trial results (from the South and under the GAP of Italy) were not considered sufficient to estimate a maximum residue level for cabbage.

The GAP for use on cabbage in China is: 3 × 0.29 kg ai/ha or 3 × 0.048 kg as/hL, SC, 3 day PHI. The residue values in ranked order (n = 4) were: 4.5, 4.7, 4.9, 5.5 mg/kg. Four trial results were not considered sufficient to estimate a maximum residue level for cabbage.

Trials were reported from the USA for the foliar application of an SC formulation to broccoli. However, the proposed GAP/label has been withdrawn in the USA. Trials were also presented from Belgium, United Kingdom, France, Germany, Italy, and Spain. No label/GAP was available for a European country.

Trials were reported from Taiwan for Chinese Broccoli. The ranked order of trial results for trials conducted according to the maximum GAP of Taiwan (3 × 0.20 kg as/hL, SC, 9 day PHI) is: 1.2, 1.3 mg/kg. The Meeting considered two trials insufficient for the estimation of a maximum residue level and STMR.

Trials were reported for Brussels sprouts from Germany, Spain, France, Sweden, Italy, United Kingdom, and the Netherlands. A label was available for Italy (2 × 0.24 kg ai/ha, SC, 3 day PHI). Four trials were conducted in the southern Europe (0.10, 0.12, 0.35, 0.39) mg/kg), and eight trials were conducted in the northern Europe (0.07 (2), 0.10, 0.11, 0.13, 0.16, 0.22, 0.60 mg//kg). The data sets are not from different populations and could be combined for evaluation against the GAP of Italy. The residue values (n = 12) in ranked order were: 0.07 (2), 0.10 (2), 0.11, 0.12, 0.13, 0.16, 0.22, 0.35, 0.39, 0.60 mg/kg.

The Meeting estimated an STMR of 0.125 mg/kg. The Meeting estimated a maximum residue level of 0.8 mg/kg. The maximum residue level estimate derived from use of the NAFTA calculator was 0.76 mg/kg. The normal JMPR procedure is to use one significant figure for maximum residue levels below 10 mg/kg. With rounding the value derived from use of the calculator corresponded to the Meeting's recommendation, i.e., 0.8 mg/kg rounded.

Fruiting vegetables, Cucurbits

Melon field trials were reported from Greece and Spain. No label/GAP is available for melons or cucurbits. As there was no GAP provided to support the trials, the Meeting could not estimate a maximum residue level for melons.

Fruiting vegetables Other than Cucurbits

Chilli pepper field trials were reported from South Korea and the USA. However, the proposed label in the USA has been withdrawn. The ranked order of trials from South Korea that approximate the maximum GAP of South Korea (3 × 0.016 kg as/hL, SC, 2 day PHI) was: 0.10 and 0.12 mg/kg. The Meeting noted that two trials were insufficient to estimate a maximum residue level, HR, and STMR.

Field trial studies for peppers (bell or sweet) were reported from the USA. However, the proposed label in the USA was withdrawn.

Glasshouse trial studies on peppers were reported from Germany, the Netherlands, France, Italy, Spain, and Greece. Relevant labels were available for Germany, Italy, and Austria. The labels specify 2 × 0.024 kg as/hL, 3 day PHI in Germany and Italy, 1 day PHI in Austria. Residue data for a 1 day PHI were not supplied. The GAPs of Germany and Italy were utilized, and the residue values in ranked order (n = 15) were: 0.10 (2), 0.16, 0.18 (5), 0.24 (2), 0.30, 0.34 (2), 0.35 (2) mg/kg.

The Meeting estimated a STMR of 0.18 mg/kg. The Meeting estimated a maximum residue level of 0.6 mg/kg. The maximum residue level estimate derived from use of the NAFTA calculator was 0.56 mg/kg. The normal JMPR procedure is to use one significant figure for maximum residue levels below 10 mg/kg. With rounding, the value derived from use of the calculator corresponded to the Meeting's recommendation, i.e., 0.6 mg/kg rounded.

Tomato field trial studies were reported from the USA. However, the proposed label in the USA has been withdrawn.

Tomato field trial studies were reported from Spain and Italy. The GAP/label of Italy specifies 2 × 0.24 kg ai/ha, SC, and a 3 day PHI. The ranked order of trial results (n = 10) were: 0.03 (4), 0.04 (2), 0.07, 0.10 (2), 0.14 mg/kg.

Tomato glasshouse studies were reported from Germany, the Netherlands, Spain, France, Italy, and Greece. Labels for use in glasshouses were available from Austria, Germany, and Italy. All specify 2 × 0.24 kg ai/ha. There is a 1 day PHI in Austria and a 3 day PHI in Germany and Italy. Residue data were not available for a 1 day PHI. The labels for Germany and Italy were utilized to arrive at the ranked order of residue values (n = 10) of: < 0.02, 0.08, 0.09, 0.10, 0.11, 0.13 (2), 0.17, 0.25, 0.36 mg/kg. The Meeting noted that the tomatoes from glasshouses generated a higher residue value set than those from field trials in Europe.

Using the glasshouse trials from Europe, the Meeting estimated an STMR of 0.18 mg/kg. Noting the similarity of the residue populations for peppers and tomatoes, the Meeting estimated a maximum residue level of 0.6 mg/kg was appropriate for tomatoes.

The maximum residue level estimate derived from use of the NAFTA calculator was 0.69 mg/kg. The normal JMPR procedure is to use one significant figure for maximum residue levels below 10 mg/kg. With rounding the value derived from use of the calculator was 0.7 mg/kg rounded. The Meeting noted the similarity of the tomato and pepper data sets and the 0.6 mg/kg estimate for peppers was selected for tomatoes

The Meeting agreed to use the tomato and pepper data as support for eggplant (aubergine) and estimated a STMR and a maximum residue level of 0.18, and 0.6 mg/kg, respectively, for eggplant.

Using the default dehydration factor of 10, the meeting estimated an STMR of 1.8 and a maximum residue level of 6 mg/kg for dried chilli peppers.

Leafy Vegetables

Chinese cabbage field trials were reported from Japan, Korea, and Taiwan. No label was available for Japan, and the Japanese trials were evaluated against the label of Taiwan (3 × 0.029 kg as/hL, SC, 18 day PHI). Results in ranked order are: < 0.10 (2), 0.76, 0.77 mg/kg. Two trials from Taiwan match the Taiwan label: 1.4, 1.6 mg/kg. One trial from South Koreas matches the South Korea label (2 × 0.016 kg as/hL, 7 day PHI): 2.1 mg/kg. The trials matching Taiwan GAP were combined: < 0.10 (2), 0.76, 0.77, 1.4, 1.6 mg/kg. The Meeting utilized the trials from Japan and Taiwan to estimate an STMR of 0.765. The Meeting estimated a maximum residue level of 6 mg/kg appropriate.

The maximum residue level estimate derived from use of the NAFTA calculator was 5.97 mg/kg. With rounding the value derived from use of the calculator corresponded to the Meeting's recommendation, i.e., 6 mg/kg.

Field trial studies were reported from the USA for lettuce, spinach, and mustard greens. However, the proposed labels in the USA had been withdrawn.

Trials for head lettuce were reported from the Netherlands, Spain, Germany, France, Greece, Denmark, and Italy. A label was available for Italy (3 × 0.24 kg ai/ha, SC, 3 day PHI). The residue values in ranked order (n = 8) for the trials from southern Europe were: 0.76, 1.8, 2.7, 2.8, 3.0 (2), 3.6, 5.0 mg/kg. The residue values in ranked order (n = 8) for trials from northern Europe were: 1.0, 1.2, 1.4, 1.5, 1.7, 2.0 (3). The Meeting agreed that the data from the northern and southern European trials

appear to be from similar populations and could be combined (n = 16): 0.76, 1.0, 1.2, 1.4, 1.5, 1.7, 1.8, 2.0 (3), 2.7, 2.8, 3.0 (2), 3.6, 5.0 mg/kg.

Trials for head lettuce grown in glasshouses were reported from Germany, France, the Netherlands, Italy, Greece and Spain. However, the only available approved label, from Italy, specified field use only.

The Meeting estimated an STMR of 2.0 mg/kg for head lettuce based on the field trials in Europe. The Meeting estimated a maximum residue level of 7 mg/kg. The maximum residue level estimate derived from use of the NAFTA calculator was 6.24 mg/kg. With rounding the value derived from use of the calculator was 7 mg/kg.

Legume Vegetables

The Meeting received a field trial study report for soya beans from Taiwan. However, only two trials were reported (0.30, 0.45 mg/kg) conducted at the maximum GAP of Taiwan (0.033 kg as/hL, 15 day PHI). The Meeting considered two trials an insufficient number for the estimation of a maximum residue level, HR, and STMR.

Root and Tuber Vegetables

Potato field trial studies were reported from the USA. However, the pending label has been withdrawn.

Potato field trial studies were reported from the United Kingdom, the Netherlands, Spain, Germany, France and Italy. Relevant labels were provided for Austria, Croatia, Germany, Hungary, Italy, Macedonia, Romania and Serbia. The application rate is 0.06 kg ai/ha (except in Macedonia at 0.072 kg ai/ha) and 2 treatments (except 3 in Italy and 4 in Macedonia), and a PHI of 14 days (except 3 days in Romania and not specified in Hungary and Germany). Using the GAP of Italy, the residue values in ranked order were: < 0.02 (11) mg/kg. One trial conducted at an exaggerated rate (3 × 1 kg ai/ha) also yielded < 0.02 mg/kg. It was also noted that in thirty-three trials conducted in the USA at 4 × 0.3 kg ai/ha, PHI 7 days, all residue values were < 0.02 mg/kg. Samples from four of these trials were < 0.02 mg/kg at a 1 day PHI. Four trials were conducted in the USA at a total seasonal rate of 5.8 kg ai/ha (4 × 1.45 kg ai/ha). Two of the trials revealed the E and/or Z isomer at 0.01 mg/kg each.

The Meeting estimated an STMR of 0 and a maximum residue level of 0.02 (*) mg/kg for potato.

The use of the NAFTA statistical calculation spreadsheet was not considered applicable as all data points were below the LOQ.

Stalk and Stem Vegetables

A report on celery field trials was received from the USA. However, the proposed label in the USA has been withdrawn. As there was no GAP provided to support the trials, the Meeting could not estimate a maximum residue level for celery.

Tree nuts

A report on almond and pecan field trials was received from the USA, for the application of a granular formulation to the soil. However, the label is pending in the USA at the time of this Meeting. As there was no approved GAP available to support the trials, the Meeting could not estimate a maximum residue level for tree nuts.

Cotton seed

Study report on cotton field trials in the USA, Spain and Greece were available. However, the relevant pending label in the USA has been withdrawn and no additional approved labels were made available. As there was no GAP information available to support the trials, the Meeting could not estimate a maximum residue level for cotton seed.

Fate of residues during processing

A *nature of the residue* under simulated processing conditions study was received. Hydrolyses of benzonitrile ring-U-[^{14}C]metaflumizone and trifluromethoxyphenyl ring-U-[^{14}C]metaflumizone were conducted at 90 °C in pH 4 aqueous buffer for 20 minutes (pasteurization simulation), at 100 °C in pH 5 aqueous buffer for 60 minutes (baking, brewing, boiling simulation), and at 120 °C in pH 6 aqueous buffer for 20 minutes (sterilization simulation). Metaflumizone was not stable at pH 4 and pH 5 (90 °C–100 °C). Metaflumizone loss was as much as 40%. The hydrolysis products were M320I04 and M320I08.

Processing studies were provided for tomato, cabbage, lettuce, potato, and cotton seed. The potato processing studies could not be used to derive processing factors, as the RAC contained no residues above LOQ and all processed fraction residues were below the LOQ.

The processing factors and the derived STMR-P and HR-P values relevant to proposed maximum residue levels are summarized as follows:

RAC	Processed Commodity	Processing Factor [a, b]	RAC maximum residue level	RAC STMR	Processed Commodity STMR-P
Tomato	Juice	< 0.33 < 0.14 < 0.19 < 0.046 Median 0.16	0.6	0.125	0.020
	Wet pomace	1.5 2.4 3.1 1.1 Median 2.0	0.6	0.125	0.25
	Puree	0.48 0.20 0.42 0.23 Median 0.32	0.6	0.125	0.040
	Paste	1.5 0.80 0.89 0.54 Median 0.84	0.6	0.125	0.10
	Canned	< 0.33 < 0.14 < 0.19 < 0.046	0.6	0.125	0.020

RAC	Processed Commodity	Processing Factor [a, b]	RAC maximum residue level	RAC STMR	Processed Commodity STMR-P
		Median 0.16			

[a] Each value represents a separate study. The factor is the ratio of the total residue in the processed item divided by the total residue in the RAC. The total residue is the parent metaflumizone (E isomer + Z isomer).

[b] Processing studies were conducted for potatoes. However, RAC samples were at or below the LOQ (0.04 mg/kg), and no residues were found in any processed commodity (< 0.04 mg/kg).

Residues in animal commodities

The Meeting received reports of lactating cow and laying hen feeding studies.

Laying hens

Hens were dosed orally for 55 days at levels of 0.1, 0.3, and 1 ppm based on feed consumption. Residues reached a plateau in eggs between day 21 and day 25. For the 0.1 ppm feeding regime, total residues of metaflumizone in eggs, muscle, liver, and fat at day 55 were 0.038–0.061 mg/kg, < 0.02–0.021 mg/kg, 0.029–0.033 mg/kg, and 0.30–0.34 mg/kg, respectively. Residue levels were approximately linear with dose.

Lactating dairy cattle

Holstein cows were dosed orally for 45 days at levels of 0.2, 1.0, 5.5, and 16.2 ppm in the feed. Total metaflumizone residues were below the LOQ (< 0.01) in whole milk at the 0.2 and 1.0 ppm feeding levels. Cream (day 40) from the 1.0 ppm level contained 0.047–0.052 mg/kg metaflumizone (E + Z). At the 5.5 ppm feeding level, metaflumizone in milk reached a plateau of 0.02–0.03 mg/kg between day 21 and day 25. Liver, kidney, and muscle contained no residue (< 0.02 mg/kg) at the 0.2, 1.0, and 5.5 ppm levels; fat contained residue at the LOQ (0.02 mg/kg) at the 1.0 ppm level. At the 5.5 ppm feeding level, residues were 0.12–0.18 mg/kg in fat.

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculation results for beef cattle and dairy cattle are provided below. The calculations are in Annex 6 of the 2009 JMPR Report and were made according to the animal diets from Canada-USA, EU, and Australia in the *Table of OECD Feedstuffs Derived from Field Crop* (Annex 6 of the 2006 JMPR Report).

There are no potential poultry feed items. Potential cattle feed items include: potato culls and pulp and waste, and tomato pomace.

Animal dietary burden, metaflumizone total residue, ppm of dry matter diet				
		US-Canada	EU	Australia
Beef cattle	max	0.00	0.00	0.13[a]
	mean	0.00	0.00	0.13[b]
Dairy cattle	max	0.00	0.00	0.13[a]
	mean	0.00	0.00	0.13[b]

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

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

Animal commodity maximum residue levels

Cattle

In the table below, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [], and estimated concentrations related to the dietary burdens are shown without brackets.

Dietary Burden (ppm) Feeding Level [ppm]	Cream	Milk	Muscle	Liver	Kidney	Fat
MRL	Mean	Mean	Highest	Highest	Highest	Highest
MRL beef cattle (0.13) [0.2]			0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]
MRL dairy cattle (0.13) [0.2]	0.0065 [< 0.01]	0.0065 [< 0.01]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]
STMR	Mean	Mean	Mean	Mean	Mean	Mean
STMR beef cattle (0.13) [0.2]			0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]
STMR dairy Cattle (0.13) [0.2]	0.0065 [< 0.01]	0.0065 [< 0.01]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]	0.013 [< 0.02]

The data from the lactating dairy cow feeding study was used to support mammalian (except marine) milk and meat maximum residue levels.

The Meeting estimated the following STMR values: milk 0.007; milk fat 0.013; muscle 0.013; edible offal 0.013; fat 0.013 mg/kg. Cream was assumed to contain 50% fat.

The Meeting estimated the following maximum residue levels for mammalian commodities (except marine): milk 0.01 (*); milk fat 0.02; meat (fat) 0.02 (*); edible offal 0.02 (*).

RECOMMENDATIONS

The Meeting estimated the maximum residue levels and STMR values shown below. The maximum residue levels are recommended for use as maximum residue limits.

For plants and animals, definition of the residue (for compliance with maximum residue level and estimation of dietary intake): *Metaflumizone, sum of E-isomer and Z-isomer.*

Metaflumizone is fat soluble.

Commodity CCN	Name	Recommended MRL mg/kg	STMR or STMR-P, mg/kg
VB0402	Brussels sprouts	0.8	0.125
VL467	Chinese cabbage	3	0.49
(VO444)	Chilli pepper, dried	6	1.8
MO105	Edible offal, mammalian	0.02 (*)	0.013
VO0440	Egg plant	0.6	0.18
VL482	Lettuce, Head	7	2.0

Commodity CCN	Name	Recommended MRL mg/kg	STMR or STMR-P, mg/kg
MM95	Meat (from mammals other than marine mammals)	0.02 (*) (fat)	0.013 (muscle) 0.013 (fat)
ML106	Milks	0.01 (*)	0.007
FM183	Milk fats	0.02	0.013
VO0051	Pepper	0.6	0.18
VR589	Potato	0.02 (*)	0
VO0448	Tomato	0.6	0.12

DIETARY RISK ASSESSMENT

Long-term intake

The International Estimated Daily Intakes of metaflumizone, based on the STMRs estimated for the 12 commodities, for the 13 GEMS/Food regional diets, were in the range 0–1% of the maximum ADI of 0.1 mg/kg bw (see Annex 3 of the 2009 JMPR Report). The Meeting concluded that the long-term intake of residues of metaflumizone from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The 2009 JMPR decided that an ARfD was unnecessary. The Meeting therefore concluded that the short-term intake of metaflumizone residues is unlikely to present a public health concern.

REFERENCES

Code	Author	Year	Title, Institute & Report reference
2002/1006303	Weber H	2002	BAS 320 I: Examination of the applicability of DFG method S 19 (extended revision) for the determination of residues of BAS 320 I. Final report BAS-0209. Dr. Specht & Partner Chemische Laboratorien GmbH; Hamburg; Germany Fed. Rep. 2002/1006303. Unpublished.
2002/5003841	Holman JC	2002	BAS 320 I: Determination of solubility in various organic solvents. BASF Corporation. Report No ENV 01-040. Ewing NJ 08618; United States of America. 2002/5003841. Unpublished.
2002/5003842	Mallipudi NM	2002b	BAS 320 I (AC 836519): Metabolism of [Benzonitrile Ring-U-^{14}C] and [Trifluoromethoxyphenyl Ring-U-^{14}C] BAS 320 I in cotton under field conditions. Report No MET 02-007. BASF Corporation Agro Research; Princeton NJ 08543-0400; United States of America. 2002/5003842. Unpublished.
2002/5004090	Mallipudi NM	2002a	BAS 320 I (AC 836519): Metabolism of [Benzonitrile ring-U-^{14}C] and [Trifluoromethoxyphenyl ring-U-^{14}C] BAS 320 I in tomato under field and shade cloth greenhouse conditions. Report No MET 02-008. BASF Corporation Agro Research; Research Triangle Park, NC 27709; USA. 2002/5004090. Unpublished.
2003/1001353	Raunft E et al	2003	Study on the residue behaviour of BAS 320 I in potato after application of BAS 320 00 I under field conditions in France, Germany, United Kingdom, the Netherlands, Spain and Italy, 2002. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed.Rep. Project 100331, includes AGR/12/02, ALO/13/02, AYE/09/02, DU2/10/02, DU4/11/02, FAN/08/02, FBD/08/02, FLT/09/02, ITA/16/02, OAT/14/02. 2003/1001353. Unpublished.
2003/1001359	Beck J et al	2003	Study on the residue behaviour of BAS 320 I on sweet pepper after application of BAS 320 00 I under greenhouse conditions in Germany, the Netherlands, France, Italy and Spain, 2002. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed.Rep. Project 144535, includes ACK/12/02, AGR/17/02, ALO/24/02, FBM/11/02, ITA/21/02. 2003/1001359. Unpublished.

Code	Author	Year	Title, Institute & Report reference
2003/1006450	Kaestel R	2003a	Physical properties of BAS 320 I (TC). BASF AG, Agrarzentrum Limburgerhof. Study Code 131156/1. Limburgerhof; Germany Fed. Rep. 2003/1006450. Unpublished.
2003/1006454	Kaestel R	2003b	Physical properties of BAS 320 I (PAI). BASF AG, Agrarzentrum Limburgerhof. Study Code 131147/1. Limburgerhof; Germany Fed. Rep. 2003/1006454. Unpublished.
2003/1009786	Raunft E	2004	Study on the residue behaviour of BAS 320 I in cotton after application of BAS 320 00 I under field conditions in Spain, 2002. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed.Rep. Study no. 67780, includes ALO/21/02, AYE/19/02. 2003/1009786. Unpublished.
2003/1009792	Schulz H	2003	Determination of the residues of BAS 320 I in cotton following treatment with BAS 320 00 I under field conditions in Greece 2002. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Study no. 67780, includes 02RF031/1, 02RF031/2. 2003/1009792. Unpublished.
2003/1019889	Fabian E and Knoell H-E	2004	The metabolism of ^{14}C-BAS 320 I in lactating goats. Study Code 83537. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2003/1019889. Unpublished.
2003/1021953	Koenig W	2004	Interim Report: Shelf life in glass bottle of the technical material BAS 320 I. 12 months - analytical results. Study Code PCF02489. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2003/1021953. Unpublished.
2003/5000300	Johnston R L	2004a	The Magnitude of BAS 320 I Residues in Potato Processed Fractions BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. 2003/5000300. Unpublished.
2003/5000309	Johnston R L	2004b	The Magnitude of BAS 320 I Residues in Cotton. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study no. 67172, includes RCN 2002129, RCN 2002130, RCN 2002131, RCN 2002132, RCN 2002133, RCN 2002134, RCN 2002135, RCN 2002136, RCN 2002137, RCN 2002138, RCN 2002139, RCN 2002140. 2003/5000309. Unpublished.
2003/5000346	Leonard R C	2004a	The Magnitude of BAS 320 I Residues in Leafy Vegetables. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study no. 83619, includes RCN 2002141, RCN 2002142, RCN 2002143, RCN 2003104, RCN 2003105, RCN 2003147 (head lettuce); RCN 2002144, RCN 2002145, RCN 2002146, RCN 2003101, RCN 2003140, RCN 2003103 (leaf lettuce); RCN 2002147, RCN 2002148, RCN 2002149, RCN 2003107, RCN 2003108, RCN 2003109 (celery); RCN 2002150, RCN 2002151, RCN 2002152, RCN 2003110, RCN 2003111, RCN 2003112 (spinach). 2003/5000346. Unpublished.
2003/5000347	Leonard RC	2004b	The Magnitude of BAS 320 I Residues in Brassica. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study no. 67168, includes RCN 2002153, RCN 2002154, RCN 2002155, RCN 2003113, RCN 2003114, RCN 2003115 (Broccoli); RCN 2002156, RCN 2002157, RCN 2002158, RCN 2003116, RCN 2003117, RCN 2003118 (cabbage); RCN 2002159, RCN 2002160, RCN 2002161, RCN 2003119, RCN 2003120 (mustard greens). 2003/5000347. Unpublished.
2003/5000445	Johnston R L	2004c	The Magnitude of BAS 320 I Residues in Fruiting Vegetables. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study No. 83669, includes RCN 2002162, RCN 2002163, RCN 2002164, RCN 2002165, RCN 2002166, RCN 2002167, RCN 2003121, RCN 2003122, RCN 2003123, RCN 2003124, RCN 2003125, RCN 2003126 (tomato), RCN 2002168, RCN 2002170, RCN 2002171, RCN 2002172, RCN 2003127, RCN 2003128, RCN 2003130 (pepper), RCN 2002169 (chili pepper). 2003/5000445. Unpublished.
2003/5000537	Johnston R L	2004d	Amended Final Study Report. The Magnitude of BAS 320 I Residues in Potatoes. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study no. 67170, includes RCN 2002113, RCN 2002114, RCN 2002115, RCN 2002116, RCN 2002117, RCN 2002118, RCN 2002119, RCN 2002120, RCN 2002121, RCN 2002122, RCN 2002123, RCN 2002124, RCN 2002125, RCN 2002126, RCN 2002127, RCN 2002128. 2003/5000537. Unpublished.
2003/5000571	Ta C	2004a	Aqueous photolysis of ^{14}C-BAS 320I. Study No 83453. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America.

Code	Author	Year	Title, Institute & Report reference
			2003/5000571. Unpublished.
2003/5000574	Paulick RC	2003	Determination of the Henry's Law constant for BAS 320 I at 25°C. BASF Corporation Agricultural Products Center; Research Triangle Park NC 27709-3528; United States of America. 2003/5000574. Unpublished.
2004/1000741	Hoefs R	2004a	BAS 320 I (AC 836519): Confined accumulation study of (^{14}C) BAS 320 I in rotational crops. Study Code M01P519DE1. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1000741. Unpublished.
2004/1000742	Hoefs R	2004b	Additional trials to the confined rotational crop study with ^{14}C-BAS 320 I. Study Code 130967. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1000742. Unpublished.
2004/1000745	Hoefs R and Mackenroth C	2004a	Validation of the analytical method 531/0: Method for the determination of BAS 320 I (E- and Z-isomer) and its metabolites M320I04 (Reg.No. 409 6485) and M320I23 (Reg.No. 498 4051) in plant matrices and processed fractions. Study Code 137812. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1000745. Unpublished.
2004/1000747	Rabe U and Glaessgen WE	2004	Metabolism of ^{14}C-BAS 320 I in white cabbage. Study Code 83425. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1000747. Unpublished.
2004/1000747	Rabe U and Glaessgen WE	2004	Metabolism of ^{14}C-BAS 320 I in white cabbage. Study Code 83425. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1000747. Unpublished.
2004/1004634	Tilting N and Mackenroth C	2004	Validation of the method 528/0: Determination of BAS 320 I in matrices of animal origin by LC-MS-MS. Study Code 83549. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1004634. Unpublished.
2004/1005042	Beimborn DB and Leibold E	2004	^{14}C-BAS 320 I - Adsorption, distribution and excretion after repeated oral administration in lactating goats. Laboratory Project Identification No 02B0099/026017. BASF AG; Ludwigshafen/Rhein; Germany Fed. Rep. 2004/1005042. Unpublished.
2004/1006465	Klimmek S	2004	Determination of BAS 320 I (E- and Z-isomer) and its metabolites M320I04 (Reg.No. 409 6485) and M320I23 (Reg.No. 498 4051) in plant matrices and processed fractions - Independent laboratory validation of the method 531/1 - Institut Fresenius. Study Code 83477. Study No IF-03/00108288. Chemische und Biologische Laboratorien AG; Taunusstein; Germany Fed. Rep. 2004/1006465. Unpublished.
2004/1006476	Schroth E	2004a	Study on the residue behaviour of BAS 320 I after application of BAS 320 00 I on tomato under field conditions in Spain, 2003. Agrologia SL; Palomares; Spain. includes ALO/27/03, ALO/28/03, ALO/29/03, ALO/30/03. 2004/1006476. Unpublished.
2004/1010549	Raunft E et al	2004	Study on the residue behaviour of BAS 320 I in greenhouse tomatoes after application of BAS 320 00 I under field conditions in Germany, The Netherlands, France (North and South), Italy and Spain, 2002. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed.Rep. Project 83845 , includes ACK/06/02, AGR/10/02, ALO/08/02, FAN/07/02, FTL/06/02, ITA/12/02. 2004/1010549. Unpublished.
2004/1010609	Fabian E and Glaessgen W	2004	The metabolism of ^{14}C-BAS 320 I in laying hens. Study Code 83543. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1010609. Unpublished.
2004/1010610	Beimborn DB and Leibold E	2003	^{14}C-BAS 320 I - Absorption, distribution and excretion after repeated oral administration in laying hens. Laboratory Project Identification No 02B0099/026002. BASF AG; Ludwigshafen/Rhein; Germany Fed. Rep. 2004/1010610. Unpublished.
2004/1015196	Hassink J	2004	Photochemical oxidative degradation of BAS 320 I (QSAR estimates). Study Code JH-04-08. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1015196. Unpublished.
2004/1015957	Hoefs R and Mackenroth C	2004b	Investigation of the storage stability of BAS 320 I in plant material under usual storage conditions. Study Code 83487. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1015957. Unpublished.
2004/1020818	Tilting N and Mackenroth C	2004b	A meat and egg magnitude of the residue study with BAS 320 I (Reg.No. 4080134) in laying hens. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed.Rep. 2004/1020818. Unpublished.

Code	Author	Year	Title, Institute & Report reference
2004/1020819	McLellan G J and Vance C	2005	Residues of BAS 320 I in milk and tissues of dairy cows following multiple oral administrations. Inveresk; Tranent EH33 2NE; United Kingdom. 2004/1020819. Unpublished.
2004/1022504	Janz U and Bayer H	2005	Aerobic rate of degradation of BAS 320 I (CF3-^{14}C-penyl) in soil (DT50/DT90). Study Code 83523. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1022504. Unpublished.
2004/1024760	Hoefs R and Mackenroth C	2004d	Investigations of the storage stability of M320I23 (Reg.No. 4984 051) in plant material under usual storage conditions. Study Code 131117. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1024760. Unpublished.
2004/1024761	Schroth E	2004b	Study on the residue behavior of BAS 320 I on cotton after application of BAS 320 00 I under field conditions in Spain and Greece, 2004. Agrologia SL; Palomares; Spain. Study no. 135278, includes ALO/09/04, ALO/10/04, GRE/07/04, GRE/08/04. 2004/1024761. Unpublished.
2004/1024762	Schroth E	2004c	Study on the residue behavior of BAS 320 I on tomato after application of BAS 320 00 I under field conditions in Italy and Spain, 2004. Agrologia SL; Palomares; Spain. Project 164110, includes ALO/11/04, ALO/12/04, ITA/04/04, ITA/05/04. 2004/1024762. Unpublished.
2004/1024764	Hoefs R and Mackenroth C	2004c	Investigation of the storage stability of M320I04 (Reg.No. 4096485) in plant material under usual storage conditions. Study Code 131114. BASF AG, Agrarzentrum Limburgerhof; Limburgerhof; Germany Fed. Rep. 2004/1024764. Unpublished.
2004/1025823	Imrie G	2004	Independent validation of an analytical method for the determination of BAS 320 I (E- and Z-Isomer) in animal tissues, eggs and milk. YBS Study No YAP/006. York Bioanalytical Solutions; Upper Poppleton York YO26 6QR; United Kingdom. 2004/1025823. Unpublished.
2004/5000055	Afzal J	2004a	BAS 320 I (AC 836519): Metabolism of (Benzonitrile Ring-U-^{14}C) and (Trifluoromethoxyphenyl Ring-U-^{14}C) BAS 320 I in tomato under field and shade cloth greenhouse conditions - Report Amendment Number 1. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America. 2004/5000055. Unpublished.
2004/5000056	Afzal J	2004b	BAS 320 I (AC 836519): Metabolism of [Benzonitrile Ring-U-^{14}C] and [Trifluoromethoxyphenyl Ring-U-^{14}C] BAS 320 I in cotton under field conditions - Report Amendment number 1. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America. 2004/5000056. Unpublished.
2004/5000067	Ta C	2004c	BAS 320 I: Aerobic soil metabolism - Amended final report. BASF Study No E-00-32. BASF Agro Research Ewing; Ewing NJ 08618; United States of America. 2004/5000067. Unpublished.
2004/5000203	Johnston R L	2004e	Amended final report: The Magnitude of BAS 320 I residues in tomato processed fractions. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. 2004/5000203. Unpublished.
2004/5000468	Wofford J T	2004a	Study on the residue behavior of BAS 320 I after application of BAS 320 00 I on sweet pepper under greenhouse conditions in the Netherlands, France, Italy, Greece and Spain 2003. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Project 144538, includes AGR/07/03, AYE/03/03, FBM/04/03, GRE/04/03, ITA/06/03. 2004/5000468. Unpublished.
2004/5000469	Wofford J T	2004b	Study on the residue behavior of BAS 320 I after application of BAS 320 00 I on tomato under greenhouse conditions in the Netherlands, France, Greece and Spain, 2003. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Project 83849, includes AGR/08/03, AYE/04/03, FAN/08/03, GRE/05/03. 2004/5000469. Unpublished.
2004/5000688	Jordan J	2004	The Magnitude of BAS 320 I Residues in Fruiting Vegetables 2004. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. Study No. 134126, includes RCN 2004168, RCN 2004169, RCN 2004170 (chili peppers). 2004/5000688. Unpublished.
2004/5000736	Stewart J	2005	Storage stability of BAS 320 I and its metabolites in treated plant samples. Study No 131954. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America. 2004/5000736. Unpublished.
2004/5000782	Yacoub R	2004	BAS 320 I (AC 836519): Determination of vapour pressure. BASF Agro Research RTP. Study No 82171. Research Triangle Park, NC 27709; United

Code	Author	Year	Title, Institute & Report reference
			States of America. 2004/5000782. Unpublished.
2004/5000784	Ta C	2004b	Report amendment No. 1 to final report Aqueous photolysis of ^{14}C-BAS 320 I. Study Code 83453. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America. 2004/5000784. Unpublished.
2004/7007518	Fang C	2004	Amended final report: Hydrolysis of ^{14}C-BAS 320I in aqueous media (25°C). BASF Protocol No 83451. BASF Agro Research RTP; Research Triangle Park, NC 27709; United States of America. 2004/7007518. Unpublished.
2004/7007519	Fang C	2004b	Amended final report: Hydrolysis of 14C-BAS 320 I at 90°C, 100°C, and 120°C. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. 2004/7007519. Unpublished.
2005/1004982	Schulz H	2005	Study on the residue behaviour of BAS 320 I in head lettuce after treatment with BAS 320 00 I under field conditions in Germany, France (N & S), the Netherlands, Spain and Greece, 2004. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134120, includes AGR/29/04, ALO/38/04, DU2/14/04, DU4/15/04, FAN23/04, FBD/24/04, FTL/26/04, GRE/25/04. 2005/1004982. Unpublished.
2005/1006466	Reichert N	2005a	Study on the residue behaviour of BAS 320 I in cabbage after treatment with BAS 320 00 I under field conditions in Denmark, Germany, Northern and Southern France, Great Britain and Spain, 2004. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134108, includes ACK/16/04, ALB/18/04, ALO/39/04, FAN/24/04, FBD/25/04, OAT/18/04. 2005/1006466. Unpublished.
2005/1006467	Reichert N	2005b	Study on the residue behaviour of BAS 320 I in Brussels sprouts after treatment with BAS 320 00 I under field conditions in Germany, Northern France, Great Britain, Italy, Sweden and Spain, 2004. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134114, includes ACK/17/04, ALO/40/04, FAN/25/04, HUS/10/04, ITA/28/04, OAT/19/04. 2005/1006467. Unpublished.
2005/1010794	Kaestel R	2005a	Density determination of M320I01 (PAI). BASF AG, Agrarzentrum Limburgerhof. Study Code 131150_1. Limburgerhof; Germany Fed. Rep. 2005/1010794. Unpublished.
2005/1010796	Kaestel R	2005b	Density determination of M320I02. BASF AG, Agrarzentrum Limburgerhof. Study Code 131150_2. Limburgerhof; Germany Fed. Rep. 2005/1010796. Unpublished.
2005/1032964	Reichert N	2006a	Study on the residue behaviour of BAS 320 I in head lettuce after treatment with BAS 320 00 I under field conditions in Germany, Denmark, Northern and Southern France, Spain, Italy and Greece, 2005. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134123, includes ALB/03/05, ALO/08/05, DU4/03/05, FAN/05/05, FBM/03/05, FTL/04/05, GRE/06/05, ITA/08/05. 2005/1032964. Unpublished.
2005/1033815	Reichert N	2006b	Study on the residue behaviour of BAS 320 I in cabbage after treatment with BAS 320 00 I under field conditions in Great Britain, Germany, Northern and Southern France, Sweden and Greece, 2005. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134111, includes DU2/04/05, FBD/07/05, FBM/04/05, GRE/07/05, HUS/03/05, OAT/06/05. 2005/1033815. Unpublished.
2005/1033816	Reichert N	2006c	Study on the residue behaviour of BAS 320 I in Brussels sprouts after treatment with BAS 320 00 I under field conditions in Germany, Northern France, Great Britain, Italy, Holland and Spain, 2005. SGS Institut Fresenius GmbH; Taunusstein; Germany Fed. Rep. Project 134117, includes AGR/14/05, ALO/09/05, DU4/04/05, FAN/06/05, ITA/09/05, OAT/08/05. 2005/1033816. Unpublished.
2005/5000005	Jordan J and Afzal J	2005	The magnitude of BAS 320 I residues in cotton processed fractions. BASF Agro Research RTP; Research Triangle Park, NC 27709; United Stated of America. 2005/5000005. Unpublished.
2006/1006702	Harant H	2008a	Determination of residues of BAS 320 I in head lettuce and its processed products after two applications of BAS 320 00 I in Germany. BioChem agrar; D-04827 Gerichshain Germany. 2006/1006702. Unpublished.
2006/1026196	Class T	2006	Determination of the n-octanol / water partition coefficient of Metaflumizone (BAS 320 I) at 20 °C. PTRL Europe. Study Code 263947_1ext. Ulm; Germany Fed.Rep. 2006/1026196. Unpublished.
2007/1060619	Park H-J and Cho K-W and Lee S-H	2007	Residual test of metaflumizone 20% SC in Chinese Cabbage. Hankook Samgong Co. , Ltd; South Korea. 2007/1060619. Unpublished.

Code	Author	Year	Title, Institute & Report reference
2007/1062741	Yongquan Z	2007	Residue Summary of 240g/L Metaflumizone SC in Cabbage. Chinese Academy of Agricultural Sciences (CAAS), China. 2007/1062741. Unpublished.
2007/1062861	Anonymous	2007	Determination of residues of metaflumizone 20% SC in red pepper. Hankook Samgong Chemicals Co., Ltd. 2007/1062861. Unpublished.
2007/7001660	Carringer S J	2007a	Magnitude of the Residue of Metaflumizone and its Metabolites in or on Tree Nuts Raw Agricultural Commodities Following One Application of BAS 320 04 I. The Carringers, Inc.; Apex, NC 27502; United Stated of America. Study no. TCI-06-152, includes TCI-06-152-01, TCI-06-152-02, TCI-06-152-03, TCI-06-152-04, TCI-06-152-05 (pecan); TCI-06-152-06, TCI-06-152-07, TCI-06-152-08, TCI-06-152-09, TCI-06-152-10 (almond). 2007/7001660. Unpublished.
2007/7001661	Carringer S J	2007b	Magnitude of the Residue of Metaflumizone and its Metabolites in or on Grape Raw Agricultural and Processed Commodities Following One Application of BAS 320 04 I. The Carringers, Inc.; Apex, NC 27502; United Stated of America. Study No. TCI-06-151, includes TCI-06-151-01, TCI-06-151-02, TCI-06-151-03, TCI-06-151-04, TCI-06-151-05, TCI-06-151-06, TCI-06-151-07, TCI-06-151-08, TCI-06-151-09, TCI-06-151-10, TCI-06-151-11, TCI-06-151-12. 2007/7001661. Unpublished.
2007/7001662	Carringer S J	2007c	Magnitude of the Residue of Metaflumizone and its Metabolites in or on Citrus Raw Agricultural and Processed Commodities Following One Application of BAS 320 04 I. The Carringers, Inc.; Apex, NC 27502; United Stated of America. Study No. TCI-06-150, includes TCI-06-150-01, TCI-06-150-02, TCI-06-150-03, TCI-06-150-04, TCI-06-150-05, TCI-06-150-06, TCI-06-150-07, TCI-06-150-08, TCI-06-150-09, TCI-06-150-10, TCI-06-150-11, TCI-06-150-12 (Orange); TCI-06-150-13, TCI-06-150-14, TCI-06-150-15, TCI-06-150-16, TCI-06-150-17, TCI-06-150-18 (Grapefruit); TCI-06-150-19, TCI-06-150-20, TCI-06-150-21, TCI-06-150-22, TCI-06-150-23 (Lemon). 2007/7001662. Unpublished.
2008/1032734	Schroth E and Martin T	2008a	Study on the residue behavior of Metaflumizone (BAS 320 I) on head lettuce after the application of BAS 320 00 I under greenhouse conditions in Belgium, France (North and South), Germany, Greece, Italy, Netherlands and Spain, 2007. Agrologia S.L.; Utrera; Spain. Study no. 280975, includes L070154, L070155, L070156, L070157, L070158, L070159, L070160, L070161. 2008/1032734. Unpublished.
2008/1035868	Schroth E and Martin T	2008b	Study on the residue behavior of Metaflumizone (BAS 320 I) on melon after the application of BAS 320 00 I under field conditions in Greece and Spain, 2007. Agrologia S.L., E-41710 Utrera (Sevilla), Spain. Study no. 281053, includes L070376, L070377. 2008/1035868. Unpublished.
2008/1037453	Schroth E and Martin T	2008c	Study on the residue behavior of Metaflumizone (BAS 320 I) on broccoli after the application of BAS 320 00 I under field conditions in Belgium, France (North), Germany, United Kingdom, Italy and Spain, 2007. Agrologia S.L.; Utrera; Spain. Study no. 280999, includes L070382, L070383, L070384, L070385, L070386, L070387. 2008/1037453. Unpublished.
2008/1043891	Harant H	2008b	Determination of residues of BAS 320 I in white cabbage and its processed products after two applications of BAS 320 00 I in Germany. BioChem agrar; D-04827 Gerichshain Germany. 2008/1043891. Unpublished.
2008/1052055	Anonymous	2008a	Residue Assay Report of Mataflumizone 22% SC on vegetable soybean.Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI); Yuenlin, Taiwan R.O.C. 2008/1052055. Unpublished.
2008/1052056	Anonymous	2008b	Residue Assay Report of Mataflumizone 22% SC on Chinese cabbage Taichung Districted Agricultural Research Station. Taichung, Taiwan 2008/1052056. Unpublished.
2008/1052057	Anonymous	2008c	Residue Assay Report of Mataflumizone 22% SC on Chinese kale. Taiwan Agrochemicals & Toxic Substances Research Institute (TACTRI). Taichung, Taiwan. 2008/1052057. Unpublished.
HC-123-018	Huang L	2001	Spectral databases for BAS 320 I and its two (2) individual isomers, CL 814027 (E) and CL 399260 (Z) (Report amendment 2). Report No APBR 1146.02. BASF Corporation Agro Research; Princeton NJ 08543-0400; United States of America. HC-123-018. Unpublished.
HC-123-028	Holman JC and Petry AS	2001	BAS 320 I: Determination of 1-octanol/water partition coefficient by HPLC method. BASF Corporation. Report No ENV 01-025. Ewing NJ 08618; United States of America. HC-123-028. Unpublished.

Code	Author	Year	Title, Institute & Report reference
HC-123-029	Petry AS	2001	BAS 320 I: Determination of dissociation constant(s) in water. BASF Corporation. Report No ENV 01-043. Ewing NJ 08618; United States of America. HC-123-029. Unpublished.
HC-311-001	Yan Z	2001	BAS 320 I: Determination of water solubility using the column elution method. Report No ENV 01-018. BASF Corporation; Ewing NJ 08618; United States of America. HC-311-001. Unpublished.
R-9005	Oumi T	2004a	Metaflumizone25%SC: Residues in or on Cabbage from Trials in 2004 Nihon Nohyaku Co.Ltd., Company report number R-9005. Unpublished.
R-9006	Oumi T	2004b	Residues in or on Chinese cabbage from Trials in 2004, Nihon Nohyaku Co.Ltd., Company report number R-9006. Unpublished.
R-9007	Yabusaki T and Mizukoshi K	2004a	Metaflumizone 25% SC: Residues in or on Cabbage from Trials in 2004. Japan Food Research Laboratories, Company report number R-9007. Unpublished.
R-9008	Yabusaki T and Mizukoshi K	2004b	Metaflumizone25%SC: Residues in or on Chinese cabbage from Trials in 2004. Japan Food Research Laboratories, Company report number R-9008. Unpublished.