KRESOXIM-METHYL

[FIGURES 1-13 are reproduced at the end of this monograph]

IDENTITY

ISO common name: kresoxim-methyl (ISO-proposed).

Chemical name

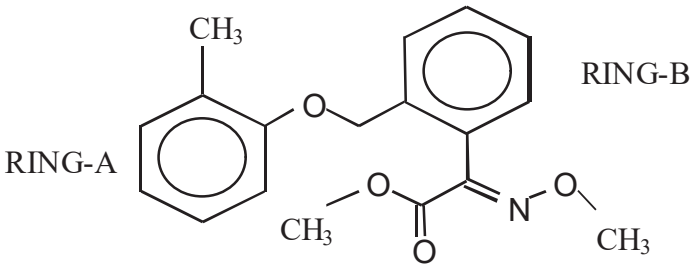
IUPAC: methyl (*E*)-methoxyimino-[α-(*o*-tolyloxy)-*o*-tolyl]acetate
methyl (*E*)-2-methoxyimino-[2-(*o*-tolyloxymethyl)phenyl]acetate

CA: (*E*)-α-(methoxyimino)-2-[(2-ethylphenoxy)methyl]benzeneacetate

CAS registry no: 143390-89-0

Synonyms: LAB 242 009
BAS 490 F

Structural formula:



Molecular formula: $C_{18}H_{19}NO_4$

Molecular weight: 313.36

PHYSICAL AND CHEMICAL PROPERTIES

Pure active ingredient

Physical State: white crystalline solid

Odour: mildly aromatic

Melting point: 101.6-102.5 (99.7% purity).

Boiling point: No boiling or sublimation of kresoxim-methyl up to 310 °C decomposition temperature using OECD method 113.

Relative Density: 1.258 at 20 °C using EEC method A 3.1.4.3

Solubility in water:	kresoxim-methyl (99.4%) 2.00 ± 0.08 mg/l at 20 °C (using EEC method A6) free acid 91 mg/l at 20 °C
Solubility in organic solvents (99.7%, 20°C)	1.7 g/kg in n-heptane 111 g/kg in toluene 939 g/kg in dichloromethane 14.9 g/kg in methanol 217 g/kg in acetone 123 g/kg in ethyl acetate
Vapour pressure:	kresoxim-methyl: 2.3 x 10^{-6} Pa at 20 °C (extrapolated). (*z*)-isomer (490M1): <1 x 10^{-5} Pa
Octanol/water partition coefficient:	kresoxim-methyl (99.4%): log K_{ow} = 3.40 at 25°C free acid: log K_{OW} = 0.15 (pH 7; 20 °C).
Dissociation constant:	kresoxim-methyl: pKa >2 and <12; titration for acidic range by OECD method 112. Dissociation in alkali claimed not to be possible because of structure. free acid: pKa = 4.2 (20 °C).
Surface tension (99.7%)	72.3 mN/m at 20°C. 0.5% (saturated) solution (EEC method A5)

Satisfactory IR, NMR and Mass Spectra of kresoxim-methyl (99.7%) were submitted.

(Binninger, 1995; BASF, 1994; Moult, 1996; Redecker, 1990, 1991; Gückel, 1992a,b; Türk 1994a,b,c; Kröhl, 1994 and Loeffler, 1992).

Technical material

Purity:	91% w/w minimum
Appearance:	light-brown powder
Physical state:	solid

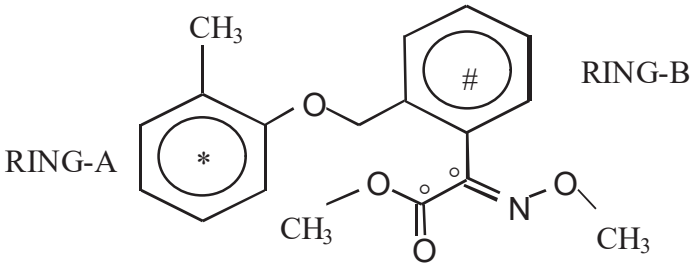
Formulations

Kresoxim-methyl is a broad spectrum fungicide structurally related to Strobilurin A, a natural product of the wood-decaying fungus *Strobilurus tenacellus*. It is a member of a new class of biologically active compounds - the strobilurins. It is formulated as an SC, WG or SE.

METABOLISM AND ENVIRONMENTAL FATE

Radiolabelled test materials

Kresoxim-methyl was labelled in one of three positions shown below.



Key to radiolabel positions:

* [*phenoxy*-U-^{14}C]kresoxim-methyl
\# [*phenyl*-^{14}C]kresoxim-methyl
° [^{13}C]kresoxim-methyl

A single page summary of the metabolism of kresoxim-methyl in animals and plants was submitted (Ammermann *et al.,* 1992) but was not used in the evaluation.

Animal metabolism

Rats. In a series of experiments on male and female Wistar rats (Kohl, 1994) the test substance was administered either orally or intravenously according to the dosing regime detailed in Table 1. Rats from groups A to D were used to determine metabolite patterns in faeces and urine, and those from dosing groups DY (phenyl-labelled) and DX (phenoxy-labelled) were used for the isolation and identification of urinary and faecal metabolites. HPLC was used to resolve the metabolites which were then identified by comparison with HPLC standards, mass spectrometry and NMR.

Table 1. Dose groups used in the metabolism studies on rats each containing 3-10 animals of each sex.

Group	Dose regime
A	Single i.v. dose 5 mg/kg bw (phenyl label). Urine and faeces analysed.
B	Single oral dose 50 mg/kg bw (phenyl label). Urine and faeces analysed.
C	Oral doses 50 mg/kg bw/day (14 daily doses no label, one dose phenyl label). Urine and faeces analysed.
D	Single oral dose 500 mg/kg bw (phenyl label). Urine and faeces analysed.
DX	Single oral dose 500 mg/kg bw (phenyl label, with 30% ^{13}c label on side chain). Urine and faeces analysed.
DY	Single oral dose 500 mg/kg bw (phenoxy label). Urine and faeces analysed.

All major and most minor metabolites were isolated, with a total of 33 metabolites (including conjugates) identified. Code numbers and chemical structures are given in Figure 13, following the section on plant metabolism.

Up to 75% of the oral dose in groups B-D was excreted unchanged in the faeces. No unchanged parent compound was detected 3.5-4 hours after oral dosing in plasma, liver or kidneys, and none was identified in the bile or urine, indicating that kresoxim-methyl is rapidly and completely metabolized after absorption from the G.I. tract.

The metabolite composition in plasma indicates that the ester cleavage, which leads to the free acid 490M1, is the fastest and most important biotransformation step which is assumed to occur

as a first-pass reaction. Accordingly, after intravenous dosing a considerable quantity of unchanged parent compound (16% of the dose) was found in the urine of female rats.

Most of the initially formed 490M1 is further metabolized, mainly by hydroxylation of the aromatic phenoxy ring and the aryl-CH_3 group. Thus, after oral administration, the metabolites 490M2 "alcohol acid", 490M9 "phenol-acid" and their glucuronides were generally the predominant final products in the excreta and in the plasma, liver and kidneys. In female rats these subsequent reactions seem to be less pronounced, since females generally excreted higher proportions of 490M1.

Mainly in males, the cleavage of the benzyl ether bridge contributes to a certain extent to the biotransformation. Fragments containing the phenyl ring were mainly recovered in the form of metabolites 490M6, 490M20, and 490M16. At the highest dose level and in the 14-day study 490M16 became relatively more important in the urine of males than females.

The phenoxy ring is further oxidized to monohydroxybenzyl alcohol, dihydroxybenzyl alcohol and salicylic acid, but these metabolites were found only as the sulfate conjugates (490M41, 490M42, 490M43 and 490M22) in the urine, together with the glucuronide of *o*-cresol, 490M37.

Glucuronated conjugates were detected in notable quantities in the bile, 490M26, 490M33, 490M25, 490M39, 490M29 being found in the largest quantity in the bile of both sexes.

The metabolite patterns in the excreta of groups B and C were qualitatively and quantitatively similar, so it would appear there was no induction of metabolic pathways by pre-dosing with kresoxim-methyl.

On the basis of these observations it is concluded that the phase I biotransformation of kresoxim-methyl is characterized by six metabolic reactions as shown in Figure 1: Cleavage of (1) the ester, (2) the oxime ether and (3) the benzyl ether bonds; (4) hydroxylation of the phenoxy ring *para* to the existing oxygen substituent, (5) oxidation of the aryl-methyl group to the benzyl alcohol and (6) its subsequent oxidation to the corresponding carboxylic acid. The (*E*)-(*Z*)-isomerization of the oxime ether group of the parent molecule is assumed to be a non-enzymatic reaction catalysed by light and/or acids. The combination of these reactions and the conjugation of the hydroxy compounds to form glucuronides or sulfates leads to the observed large number of metabolites.

Goats. In a study in 1991, either [^{13}C]- or [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity >98% and 94.6-97.6% respectively) was given orally by catheter to two goats (species not reported). Goat A was dosed with ^{14}C-labelled material at 7.1 ppm in the feed for 5 consecutive days. Goat B was dosed with a mixture of ^{13}C and ^{14}C-labelled material corresponding to an average of 450 ppm in the feed. During the dosing period blood, milk, urine and faeces were collected. Goats A and B were slaughtered 23 and 4 hours after the last dose respectively and liver, kidney, muscle, fat, bile and gastrointestinal tract were removed. Milk production appeared not to change significantly throughout the study. The total radioactivity was determined by LSC after combustion. The urine and milk samples were stored for 2 months and tissue samples for 1 month before analysis.

The distribution of radioactivity is shown in Table 2. Milk contained in total 0.031% (goat A) and 0.027% (goat B) of the total radioactivity administered. Goat A excreted 69.5% of the dose in the urine and 18.1% in the faeces, and goat B excreted 59.3% in the urine and 24.5% in the faeces. After slaughter the highest residue (mg/kg parent equivalent) was found in the kidneys and bile. In the low-dose goat A the residues in the milk, muscle and fat were below 0.01 mg/kg. The liver contained 0.038 mg/kg and kidneys 0.142 mg/kg.

Table 2. The distribution of radioactivity in goats dosed with [*phenyl*-^{14}C]kresoxim-methyl.

Sample	Goat A, 7.1 ppm feed		Goat B, 454 ppm feed	
	mg/kg as parent	% of TRR	mg/kg as parent	% of TRR
Milk, individual samples	0.001-0.003	0.001-0.005	0.068-0.316	0-0.004
Milk, total	0.025	0.031	2.74	0.027
Liver	0.04	0.06	6.81	0.07
Kidneys	0.15	0.03	14.04	0.02
Fat	0.001	0.01	0.33	<0.005
Muscle	0.001	0.01	0.22	0.01
Bile	0.49	0.03	146	0.03
Stomach lining	0.06	0.17	11.98	0.25
Stomach contents	0.18	1.09	95	8.90
Intestine lining	0.11	0.23	4.64	0.08
Intestine contents	1.13	3.10	48	1.56
Stomach/intestine cleaning water	0.03	0.09	6.84	0.44
Urine in bladder	2.15	0.91	482	0.26
Urine excreted Total (% of dose)	2.5-5.5	10.3-16.9 69.51	222-713	2.1-11.4 59.31
Faeces excreted Total (% of dose)	0.9-4.9	0.7-5.3 18.08	108-312	0.7-5.7 24.52
Blood	0.01	0.03	1.89	0.05
'Vomited' material (cud)[1]	0.03	<0.005	1.0	0.10
Tray water	0.0	<0.005	0.02	<0.005
Cage cleaning	0.11	1.08	17.63	1.47
TOTAL		94.48		97.10

[1]The report states that this material was collected from the mouth and oesophagus and is considered to be from regurgitation during normal digestion.

The identification of the radioactive compounds in various extracts from the high-dose goat is shown in Table 3. The radioactivity was measured by combustion and LSC. Urine samples were analysed directly by CI-MS, with preparative HPLC in some cases. Faeces samples were extracted with methanol followed by water. Pooled daily milk samples were extracted with methanol, centrifuged and filtered. Methanol was evaporated from the supernatant to leave the aqueous phase. Water and acetone were added and any precipitate was filtered and washed with acetone. The residues were redissolved in acetonitrile /water /formic acid and analysed by HPLC. All other samples were extracted with methanol followed by water, centrifuged and subjected to solvent partition (dichloromethane, hexane/acetonitrile and ethyl acetate separately or in combination). The extracts were further purified by silica and/or preparative HPLC where necessary. The residual precipitates were either incubated with pronase and extracted with HCl (liver) or ammonia (muscle and liver) and further purified by ion exchange or size exclusion chromatography, or were solubilized with Biolute S or toluene. Extracts were analysed by HPLC with a scintillator detector. Identification of compounds in extracts of milk and edible tissues was achieved by chromatographic comparison with extracts of urine.

The extraction of radioactivity by methanol and water ranged from 63% of the TRR in liver to 98% in kidney. The main metabolites were 490M1 (14% of the TRR in liver, 26% in muscle, present in milk), 490M2 (11% in liver, 34% in kidney), and 490M9 (10% in muscle, 63% in milk, present in fat). Minor metabolites identified were 490M6 in fat, liver and kidney, 490M18 in all tissues and 490M19 in muscle and liver. Other radioactive peaks characterized by HPLC accounted for 18% of the TRR in liver, 7% in kidney, 3% in fat, 16% in milk and 3% in muscle.

The three major metabolites were formed by cleavage of the methyl ester bond to yield the free acid 490M1, followed by side-chain hydroxylation to 490M2 and aromatic ring hydroxylation to 490M9. Minor metabolites were generated by cleavage of the oxime ether bond to 490M18, conjugation with glycine to 490M19, a combination of ring hydroxylation and oxime ether cleavage to 490M56, and by cleavage of the phenyl ether bond to 490M6. Ring hydroxylation without ester cleavage resulted in 490M15 which was found in the faeces only (Giese, 1992; Mayer, 1994).

Table 3. Compounds identified in goat tissues, milk and excreta after dosing with [*phenyl*-^{14}C]kresoxim-methyl at a level of 450 ppm in the feed. Levels expressed as mg/kg parent compound.

Sample	Extract	490-M6 mg/kg	490-M2 mg/kg	490-M9 mg/kg	490-M18 mg/kg	490-M19 mg/kg	490-M1 mg/kg	Polar mg/kg	Other extracted mg/kg	Total residual mg/kg
Urine[1]		2.1	31.7	27.7	2.1	0.3	31.5			
Faeces	methanol[2]	3.4	10.8	27.8	1.8	0.8	10.2	4.2	5.4	6.2
Milk	acetone		0.04	0.12			0.003		0.03	0.007
Muscle	EtAc[3]								0.02	
	DCM[4]								0.14	
	Hexane[5]							0.01	0.009	0.06
	ACN[3]		0.03	0.017	0.017	0.015	0.05			
	Residual			0.006			0.005		0.048	
Fat	ACN	0.03	0.08				0.08			0.06
	Hexane		0.006	0.001	0.002		0.004		0.012	
	Residual							0.033	0.04	
Liver	DCM		0.51	1.86			0.84	0.12		2.82
	EtAc		0.03	0.05	0.12					
	water	0.03	0.02	0.03	0.005	0.003	0.01	0.23		
	Residual	0.22	0.13	0.007	0.094	0.02	0.09	1.51		0.75
Kidney	methanol	0.44	4.56	4.04			2.92		0.59	0.28
	DCM								10.05	
	EtAc								1.27	
	water	0.04	0.05				0.03	0.20	0.22	
	Residual		0.007		0.03		0.02	0.19		0.034

[1]Also contained 0.2 mg/kg 490M56
[2]Also contained 12.1 mg/kg 490M15 and 1.3 mg/kg parent
[3]ethyl acetate
[4]dichloromethane
[5]acetonitrile
[6]Also contained 0.024 mg/kg parent

The metabolic pathways of kresoxim-methyl in goats are shown at the end of this monograph in Figure 2.

Hens. In a study carried out in 1992, [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity >99%) was fed to 5 hens (ISA strain) in six daily doses equivalent to 10 ppm in the feed and to 10 hens at 180 ppm in the feed. The hens were dosed in the morning before feeding but after collecting eggs and excreta. About 3 and 23 h after the final dose for the high- and low-dose groups respectively, samples were taken and stored up to 1 month before analysis. Sub-samples were combusted and analysed by LSC.

From the low dose 88.2% of the total administered radioactivity was recovered, 82.6% of which was excreted, and from the high dose 87% was recovered with 71.55% excreted. About 23 h after the final dose of 10 ppm total radioactive residues of 0.009, 0.065 and 0.082 mg/kg kresoxim-methyl equivalents were found in the skin, kidneys and liver respectively. The radioactivity in the eggs was 0.012 and 0.215 mg/kg and did not appear to reach a plateau during the study. The distribution of radioactivity is shown in Table 4.

Table 4. The distribution of radioactivity in hens dosed with [*phenyl*-^{14}C]kresoxim-methyl.

Sample	Time, h	^{14}C from 10 ppm dose		^{14}C from 180 ppm dose	
		mg/kg as kresoxim-methyl	%dose	mg/kg as kresoxim-methyl	% dose
Eggs	0-24	Nd	nd	0.100	0.02
	24-48	0.009	0.03	0.086	<0.01
	48-72	0.007	0.02	0.131	0.02
	72-96	0.009	0.02	0.164	0.02
	96-120	0.011	0.03	0.215	0.04
	120-123	-	-	-	-
	120-143	0.012	0.04	-	-
Eggs pooled[1]		0.009		0.155	
Skin	At slaughter	0.01	<0.01	0.68	<0.01
Kidney		0.06	0.01	6.36	0.04
Liver		0.08	0.02	6.98	0.14
Fat		<0.005	-	0.76	<0.01
Muscle		0.002	-	0.20	<0.01
GI tract			0.59		10.77
Balance					
Tissues			0.6		10.9
Excreta			82.6		71.5
Excreta pooled[1]		5.48		115.16	
Cage washings			4.9		5.2

[1] Used for characterization

Samples were extracted with methanol and water. Bound radioactivity was released by pronase treatment. The radioactivity was characterized by liquid/liquid partition and analysed by HPLC. The compounds in the excreta, eggs and edible tissues were isolated and identified as far as possible.

Methanol extracted 57-59% of the TRR in the skin and liver derived from the low dose, and a further 6%-9% was extracted by water. After 180 mg/kg dose, methanol extracted >75% of the TRR in the tissues and eggs from the high dose and a further 2-6% was extracted from the tissues by water. Pronase liberated 60-90% of the unextracted radioactivity from the eggs of the high-dose group and 21% from the tissues. Samples from the high-dose group were used for characterization and identification.

The main metabolites identified in the liver were the isomeric glucuronides 490M63 and 490M67 (9.2% of the TRR), 490M28 (13.7%) and 490M9 (20.1%). The main metabolites in muscle were the sulfates 490M51 and 490M66 (20.0% of the TRR) and 490M60 plus 490M20 (8.6%), in skin the parent (10.7% of the TRR) and 490M58 (10.4%), in fat the parent (41.2% of the TRR) and the non-polar 490M15 (16.6%) and 490M48 (7.7%), and in eggs the sulfates 490M51 and 490M66 (15.7% of the TRR), the glucuronide 490M31 (9.7%), 490M48 (11.4%) and the unchanged parent (8.3%). The results are shown in Table 5, and the metabolic pathways in poultry proposed by the manufacturer in Figure 3 (Burke, 1994; Grosshans, 1994c).

Table 5. Metabolites detected in hens dosed with [*phenyl*-^{14}C]kresoxim-methyl at a level equivalent to 180 ppm in the feed in six daily doses.

Sample	490-M1	490-M5	490-M6	490-M9	490-M8/11	490-M14	490-M15	490-M16	490-M20/60	490-M24	490-M25/26	490-M28	490-M31	490-M33	490-M46	490-M47	490-M48	490-M50/52
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Liver		0.30		1.35		0.18	0.18	0.16				0.92		0.20		0.21		
Muscle		0.006			0.002		0.004		0.015		0.004	0.003			0.007	0.003	0.003	0.008
Skin		0.02	0.015	0.03			0.03			0.01					0.04	0.01	0.04	
Fat							0.12			0.01					0.03		0.06	0.02
Eggs	0.005										0.004		0.012	0.005 (+M39)		0.003	0.014	0.006

Sample	490-M51/66	490-M55/65	490-M56	490-M57	490-M58	490-M59	490-M63/67	490-M64	Parent	Characterized (pronase incubated)	Characterized (polar)	Characterized (solvent)	Total Residual
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Liver					0.08	0.05	0.62			1.08	0.23	1.09	0.23
Muscle	0.03			0.003	0.01	0.004			0.005	0.03	0.01	0.019	0.007
Skin	0.03	0.0017		0.01	0.08	0.06			0.08	0.03	0.06	0.12	0.04
Fat	0.01		0.02		0.01	0.006			0.31	0.03	0.02	0.04	0.01
Eggs	0.02						0.003	0.004	0.01	0.03			0.008

Plant metabolism

Apples. In German studies carried out in 1991-93, [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity 96-98%), formulated as BAS 490 00F, was applied to 5 year old apple trees (variety Mutsu) in three different treatment patterns as follows (Hofmann, 1992a-c; Grosshans, 1994a).

(1) "Leaf application": 6 spray applications of 400 g ai/ha, PHI 14 days. The manufacturer stated that apples were present at the later leaf applications and were not protected from the spray.

(2) "Early application": 2 applications of 400 g ai/ha at the beginning of the vegetation period, PHI 149 days.

(3) "Fruit treatment": 2 applications of 800 g ai/ha to apples only, PHI 14 days.

Samples were stored frozen at -18°C for 1 month before analysis. Peel and pulp were extracted separately with methanol. The extractable radioactivity was characterized by solvent partition, TLC and HPLC. The compounds were isolated by HPLC and their structures elucidated by MS and/or chromatographic comparison with reference compounds. Acceptable chromatograms and spectra were submitted. To characterize the unextracted radioactivity, the unextractable radioactive residue was treated with dilute aqueous ammonia and lignin and cellulose fractions were separated. Individual residues in the peel and pulp were recalculated on a whole-apple basis. Extraction and characterization schemes are shown in Figures 4 and 5.

The calculated total radioactive residues in the whole apples (Table 6) were 0.36 mg/kg as kresoxim-methyl from the leaf application, 0.04 mg/kg from the early application and 0.84 mg/kg from the fruit treatment. The radioactivity remained mainly on the peel (89% to 98% of the TRR) with very low translocation to the pulp. Of the calculated TRR in the whole fruits, 94% to 98% could be extracted with methanol (Table 7). After liquid/liquid partition, the extractable radioactivity was predominantly found in the ethyl acetate phase (80% to 94% of the TRR). The unextractable ^{14}C in the peel after leaf application amounted to 4.5% of the TRR and an additional 2.2% could be released with aqueous ammonia. Part of the unextractable radioactivity was associated with lignin (3.1% of the TRR).

Table 6. The distribution of radioactivity in apples treated with phenyl-labelled [^{14}C]kresoxim-methyl. Measured and calculated TRR, parent equivalents.

Application	Application rate, kg ai/ha	PHI, days	Sample	Measured TRR[1], mg/kg	Calculated TRR[2], mg/kg
Leaf	6 x 0.4	14	fruit pulp	0.06	
			core	0.05	
			peel	1.39	2.16
			leaves	18.52	
			branches	1.73	
			total pulp (flesh + core)		0.03
			whole apple		0.36
Early	2 x 0.4	149	fruit pulp	0.01	
			core	0.04	
			peel	0.05	0.29
			leaves	1.03	
			branches	0.41	
			total pulp (flesh + core)		0.005
			whole apple		0.04
Fruit treatment	2 x 0.8	14	fruit pulp	0.02	
			core	0.02	
			peel	5.68	6.30
			leaves	0.23	
			total pulp (flesh + core)		0.02
			whole apple		0.84

[1]Total measured by combustion [2]Sum of extractable and unextractable radioactivity

Table 7. Fractionation of ^{14}C in whole apples after treatment with phenyl-labelled [^{14}C]kresoxim-methyl.

Fraction	Leaf application		Early application		Fruit treatment	
	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
TRR	0.359	100.0	0.041	100.0	0.837	100.0
MeOH extract	0.341	94.9	0.038	94.3	0.822	98.2
Unextractable residue	0.018	5.1	0.002	5.7	0.015	1.8
MeOH extract						
Ethyl acetate phase	0.317	88.1	0.033	80.0	0.784	93.6
Aqueous phase	0.025	6.9	0.005	12.8	0.027	3.2

The extracts from all three trials showed similar patterns of compounds (Table 8) and contained predominantly unchanged kresoxim-methyl (74-93% of the TRR). In extracts of the leaf application apples kresoxim-methyl (78.3% of the TRR), its isomer 490M0 (3.3%), the acid 490M1 (3.0%) and conjugates of 490M2 (1.8%) and 490M9 (2.1%) were all identified by MS.

Overall about 94% of the extractable residues from the leaf application (88.4% of the TRR) could be identified. The remaining extractable radioactivity, which was spread over several peaks, was too little for identification (0.0015 to 0.0045 mg/kg) and was characterized by chromatographic properties.

Table 8. Characterization of extractable residues in apples, calculated on a whole-apple basis.

Fraction	Metabolite identity	Leaf application		Early application		Fruit treatment	
		mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
Al	{	0.0045	1.2	0.0011	2.7		
A2	{only	0.0015	0.4	0.0002	0.5	0.0002	<0.1
A3	{character-	-	-	-	-	0.0001	<0.1
A4	{ized as	-	-	-	-	0.0003	<0.1
A5	{polar	0.0044	1.2	0.0016	4.0	0.0008	0.1
A6	{	0.0026	0.7	0.0011	2.6	-	-
A7	conjugates	0.0188	5.2	0.0025	6.1	0.0088	1.1
A7 after enzyme treatment:							
Uncleaved A7	conjugates	0.0014	0.4				
Aglycone A7/1	490-M2	0.0065	1.8				
Aglycone A7/2	490-M9	0.0076	2.1				
Aglycone A7/3	isomer of 490-M9	0.0033	0.9				
A8	490-Ml	0.0106	3:0	0.0008	1.9	0.0118	1.4
A9*	mw 313	0.0057	1.6	0.0006	1.4	0.0032	0.4
A10	Parent	0.2810	78.3	0.0301	74.0	0.7788	93.0
All	(*Z*)-isomer	0.0117	3.3	0.0005	1.2	0.0182	2.2

* the manufacturer stated that A9 was also found in the wheat metabolism study "but the position of the OH-group group is unclear."

Wheat. In German studies carried out in 1990-91, [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity 97-99.7%, formulated as BAS 490 00F), was applied twice to wheat (variety Star) at growth stages 29 and 52, at either 0.25 or 1.25 kg ai/ha. Samples were stored at -20°C for 1-4 months before analysis. Milled samples were combusted and analysed by LSC to determine the total radioactive residue (TRR).

Extraction and characterization schemes are shown in Figures 7-9. The samples were first extracted with methanol and subsequently with dilute aqueous ammonia. The extractable radioactivity was characterized by solvent partition, solid-phase extraction, TLC and HPLC. The compounds were isolated by HPLC and their structures elucidated by MS and/or chromatographic comparison with reference compounds. The unextractable radioactive residue was treated with enzymes, acids and bases, and fractionations of lignins, cellulose, protein, and starch was followed by further subdivision of the starch fraction.

The distribution of the total radioactive residues is shown in Table 9. After treatment at 0.25 kg/ha 30-99% of the TRR in the separate parts of the plants could be extracted with methanol, with the lowest proportion extracted from mature grain (Table 10). The subsequent extraction with dilute aqueous ammonia released an additional 31% of the TRR from the grain and 16% from the straw. Most of radioactivity in the ammonia extracts was recovered by chromatography on phenyl SPE cartridges. After partition between ethyl acetate and water most of the radioactivity extracted with methanol was found in the ethyl acetate phase (85-99% of the TRR). The unextractable activity was equivalent to 0.27 mg/kg in the straw (2.9% of the TRR) and 0.025 mg/kg in the grain (38.8%).

Table 9. The distribution of radioactivity in wheat treated with phenyl-labelled [^{14}C]kresoxim-methyl. Measured and calculated TRR, parent equivalents.

Application rate, kg ai/ha	PHI, days after 2nd treatment (days after 1st treatment)	Sample	Measured TRR[1], mg/kg	Calculated TRR[2], mg/kg
0.25	-56 (0)	plant	8.06	12.01
	-1 (55)	plant	2.10	1.31
0.25	0 (56)	plant	7.72	5.26
	64 (120)	grain	0.06	0.06
		glumes	1.87	2.67
		straw	12.92	9.21
		roots	1.14	
1.25	-56 (0)	plant	53.00	75.48
	-1 (55)	plant	6.07	11.84
1.25	0 (56)	plant	53.78	29.69
	63 (119)	grain	0.28	0.26
		glumes	10.82	18.43
		straw	44.8	61.39
		roots	3.17	

[1]Total measured by combustion
[2]Sum of extractable and unextractable radioactivity (MeOH)

Table 10. Extraction of radioactivity from wheat with methanol and ammonia (cf. Figure 6).

Sample	PHI days after 2nd treatment	Primary extraction		Partition of MeOH extract				Secondary extraction				SPE separation of ammonia extract			
		Methanol extract (E1)		Ethyl acetate extract (EE)		Aqueous phase (EW)		Ammonia extract (E2)		Unextractable residue (R2)		Application eluate (EA)		Methanol eluate (EM)	
		mg/kg	% of TRR	mg/kg	% of E1	mg/kg	% of E1	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
0.25 kg/ha															
Forage	-56	11.96	99.6	9.64	98.8	0.11	1.2	0.02	0.2	0.03	0.3	0.001	<0.1	0.02	0.2
Forage	-1	1.22	93.2	0.81	88.7	0.10	11.3	0.06	4.8	0.05	3.7	0.002	0.1	0.05	4.2
Forage	0	5.13	97.5	3.70	85.9	0.61	14.1	0.09	1.7	0.06	1.2	0.001	<0.1	0.08	1.5
Glumes	64	1.44	54.1	1.09	86.6	0.17	13.4	0.95	35.6	0.27	10.1	0.075	2.8	0.88	33.1
Straw	64	7.55	82.0	6.73	92.3	0.56	7.7	1.49	16.1	0.27	2.9	0.049	0.5	1.43	15.6
Grain	64	0.02	30.4	0.02	85.1	0.003	14.9	0.02	31.1	0.02	38.8	0.005	7.8	0.014	21.7
1.25 kg/ha															
Forage	-56	75.26	99.7	66.83	99.8	0.14	0.2	0.10	0.1	0.10	0.1	0.002	<0.1	0.09	0.1
Forage	-1	11.40	96.3	9.86	96.4	0.37	3.5	0.30	2.5	0.19	1.6	0.007	0.1	0.29	2.4
Forage	0	29.24	98.5	24.09	98.2	0.43	1.8	0.32	1.1	0.17	0.6	0.007	<0.1	0.30	1.0
Glumes	63	13.77	74.7	10.74	92.6	0.85	7.4	3.36	18.3	1.03	5.6	0.170	0.9	3.11	16.9
Straw	63	53.70	87.5	57.75	96.3	2.23	3.7	6.23	10.1	1.44	2.3	0.203	0.3	6.00	9.7
Grain	63	0.13	48.1	0.12	91.6	0.011	8.4	0.07	26.7	0.07	28.3	0.020	7.6	0.04	16.4

Table 11. Characterization of extractable residues in wheat treated with 0.25 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl.

Frac-tion	Identity	Forage, day of 1st treatment		Forage, 55 days after 1st treatment		Forage, day of 2nd treatment		Straw, 64 days after 2nd treatment		Grain, 64 days after 2nd treatment	
		mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
1		-		-		-		0.017	0.2	-	
2		-		-				0.011	0.1	0.001	1.5
3		-		-				0.027	0.3	0.0036	5.6
4		-		-				0.101	1.1	0.0025	3.9
5		-		0.015	1.1			0.026	0.3	0.0009	1.4
6		-		-		0.007	0.1	0.134	1.5	0.0027	4.2
7	conj[1]	-		-		0.007	0.1	0.148	1.6	-	
8	conj[1]	-		0.107	8.2	0.072	1.4	0.451	4.9	0.0020	3.1
9	conj[1]	-		0.029	2.2	0.019	0.4	0.875	9.5	0.0008	1.2
10	conj[1]	-		0.033	2.5	-		0.174	1.9	0.0002	0.3
11		-		-		-		-		0.0007	1.1
12		-		0.016	1.2	-		0.096	1.0	0.0015	2.3
13		-		-				-			
14		-		-				0.052	0.6	-	
15		-		-				0.045	0.5	-	
16		-		-				0.014	0.1	0.0021	3.3
17		-		-				0.011	0.1	-	
18		-		-				0.022	0.2	-	
19		-		-				0.033	0.4	-	
20	490M1	0.247	2.1	0.039	3.0	0.063	1.2	0.126	1.4	-	
21	490M17	-		0.037	2.8	0.031	0.6	0.329	3.6	0.0005	0.8
22		-		-				0.011	0.1	-	
23	Parent	11.506	95.8	0.980	74.8	4.889	92.8	5.923	64.3	0.0111	17.2
24		0.120	1.0	0.005	0.4	0.031	0.6	-		-	
25	490M0	0.108	0.9	0.016	1.2	0.087	1.7	0.359	3.9	0.0002	0.3
26		-		-		-		-		0.0010	1.5
27								-		0.0006	1.0
Total			99.8		97.4		98.9		97.6		48.7

[1]Conjugates include 490M2 and 490M9 (see text for levels)

The extracts of corresponding samples from the two treatment groups showed qualitatively similar patterns of compounds (see also Table 12). After treatment at 0.25 kg/ha the main radioactive residue was the unchanged parent at levels of 5.9 mg/kg in mature straw and 0.98 mg/kg in forage 1 day before the second treatment. The following compounds were also identified in the straw and -1 day forage: the (*Z*)-isomer 490M0, the acid 490M1, and conjugates of 490M2 and 490M9. The mature grain contained 0.011 mg/kg (17.2% of the TRR) of the parent and a variety of metabolites constituting 0.3-5.6% of the TRR. Enzymatic cleavage of the conjugate fractions 7-10 yielded the following respective levels of the acids 490M2 and 490M9 from the lower rate: 0.03 and 0.103 mg/kg in 55-day forage, 0.39 and 1.04 mg/kg in mature straw from the 0.25 kg/ha treatment; 0.019 and 0.003 mg/kg in mature grain from the 1.25 kg/ha treatment. Samples from the higher rate treatment contained higher relative and absolute amounts of the parent compound (Table 12).

Table 12. Characterization of extractable residues in wheat treated with 1.25 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl.

Fraction	Identity	Forage, day of 1st treatment		Forage, 55 days after 1st treatment		Forage, day of 2nd treatment		Straw, 64 days after 2nd treatment		Grain, 64 days after 2nd treatment	
		mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
1		-		-		-		-		-	
2		-		-		-		-		-	
3		-		-		-		-		0.0115	4.3
4		-		-		-		0.107	0.2	0.0076	2.9
5		-		0.011	0.1	-		0.186	0.3	-	
6		-		0.025	0.2	-		0.210	0.3	0.0023	0.9
7	conj	-		0.033	0.3	0.033	0.1	0.360	0.6	0.0010	0.4
8	conj	-		0.419	3.5	0.232	0.8	2.083	3.4	-	
9	conj	-		0.081	0.7	0.072	0.2	2.053	3.3	0.0218	8.3
10	conj	-		-		-		0.215	0.3	-	
11		-		-		-		-		-	
12		-		-		-		-		0.0032	1.2
13		-		-		-		-		0.0009	0.4
14		-		-		-		-		-	
15		-		-		-		-		-	
16		0.009	<0.1	-		-		-		-	
17		-		-		-		-		-	
18		0.005	<0.1	-		-		-		-	
19		-		-		-		-		-	
20	490M1	0.528	0.7	0.389	3.3	0.369	1.3	0.743	1.2	0.0009	0.4
21	490M17	-		0.308	2.6	0.263	0.9	2.202	3.6	0.0031	1.2
22		-		-		-		-		-	
23	Parent	73.30	97.1	10.22	86.4	27.92	94.0	50.73	82.6	0.1034	39.5
24		0.828	1.1	-		0.292	1.0	-		-	
25	490M0	0.677	0.9	0.194	1.6	0.351	1.2	0.805	1.3	-	
26		-		-		-		-		-	
W27		-		-		-		-		-	
Total			99.8		98.7		99.5		97.1		59.5

Fractionation of the unextractable radioactivity from the 0.25 kg/ha treatment (R2 residue, Table 13) in straw indicated that 2.1% of the TRR was associated with lignin and only 0.2% was incorporated into cellulose. In the grain 31.7% of the TRR was associated with or incorporated into starch, of which 9.4% of the TRR could be converted into $^{14}CO_2$ by fermentation of the glucose with yeast. The metabolic incorporation of ^{14}C in the glucose was thought to be caused by mineralization of the parent or its metabolites in soil and assimilation of the $^{14}CO_2$ by the plants at late growth stages. Lignin contained 7.9% of the TRR, protein 6.3% and cellulose 1.6%.

Table 13. Fractionation of unextractable ^{14}C in wheat treated with 0.25 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl. See Figures 6-8 for details of fractionation schemes.

Fraction		Straw		Grain	
		mg/kg	% of TRR	mg/kg	% of TRR
Total radioactive residue El + Rl		9.52	100.0	0.07	100.0
MeOH extract	El	7.69	80.8	0.02	26.8
Residue	R1	1.83	19.2	0.05	73.2
Ammonia extract	E2	1.62	17.0	0.02	33.8
Residue	R2	0.32	3.3		
HCl extract of R2	E3	0.02	0.2		
EDTA extract of residue R3	E4	0.01	0.1		

Fraction		Straw		Grain	
		mg/kg	% of TRR	mg/kg	% of TRR
Enzyme extract of R4	E5	0.07	0.8	0.004	5.6
1M HC1-hydrolysis of R5	E6	0.03	0.3		
6M HCl hydrolysis of R5	E7	0.01	0.1		
NaOH hydrolysis of R7	E8	0.09	1.0		
Total dietary fibre extract of R5	E9	0.03	0.3	0.02	25.4
Lignin, cellulose, protein and starch fractionation					
TRR		9.213.	100.0	0.06	100.0
MeOH extract	El	7.551	82.0	0.02	31.7
Extraction residue	R1	1.662	18.0	0.04	68.3
Ammonia extract	E2	1.486	16.1	0.02	31.7
Extraction residue	R2	0.269	2.9	0.02	39.7
Lignin	R11/15	0.198	2.1	0.005	7.9
Cellulose	R12/16	0.020	0.2	0.001	1.6
Protein	E2B			0.004	6.3
Starch	E13B			0.02	31.7
Fermentation of glucose from starch					
Starch fraction				0.02	32.2
Ethylene glycol				0.0003	0.5
14[$C0_2$] traps				0.006	9.4
Yeast supernatant				0.003	4.6
Yeast				0.003	5.2

Table 14. Characterization of unextractable residues in wheat treated with 1.25 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl.

Fraction		Straw		Grain	
		mg/kg	% of TRR	mg/kg	% of TRR
Lignin, cellulose, protein and starch fractionation					
TRR		61.39	100.0	0.30	100.0
MeOH extract	El	53.70	87.5	0.15	50.0
Residue	R1	7.69	12.5	0.15	50.0
Ammonia extract of R1	E2	6.23	10.1	0.07	23.5
Residue	R2	1.44	2.3	0.07	24.8
Lignin	R11/15	0.95	1.6	0.01	4.4
Cellulose	R12/16	0.07	0.1	0.05	18.5
Protein	E2B			0.008	2.7
Starch	E13B			0.002	0.7

Overall, >95% of the extractable residue could be identified or characterized in the forage and straw, and about 50% in the grain from the 0.25 kg/ha treatment. An additional 47.5% of TRR in grains was incorporated into or associated with natural products. The remaining extractable radioactivity, which was split into many peaks was too low for identification and was characterized only by chromatographic properties (Hofmann, 1991a,b; Grosshans, 1994b).

Grapes. In US studies carried out in 1991 (Nelsen *et al.,* 1995) phenoxy- and phenyl-labelled kresoxim-methyl (radiochemical purities 98.8 and 99.2%), formulated as BAS 490 F, were applied five times to mature Muscatine grape vines (variety Carlos) at rates of 0.5 kg/ha per application. Grapes were harvested 14 days after the final treatment. Samples were stored at <0°C for 1-7 months before analysis. Whole grapes were rinsed with methanol and then homogenized. The total radioactive residue was calculated at the sum of the ^{14}C in the methanol rinse and in the homogenized washed grapes, determined by combustion.

The extraction scheme is given in Figure 9. Homogenized grapes were extracted with either methanol or acetone/water. Residues in homogenates, grape rinses and unwashed samples were separated and identified by SPE, TLC, HPLC with UV and radiometric detection, GC-MS, and enzyme hydrolysis (β-glucosidase and hesperidinase). Confirmation of identifications by HPLC and TLC was by co-chromatography.

No significant differences were observed between the results for phenoxy- and phenyl-labelled kresoxim-methyl. About 40% of the TRR (1.6-1.91 mg/kg) was removed as surface residue by the methanol rinse (Table 15). There were no significant differences between the proportions extracted by methanol and acetone/water, indicating that cleavage of the molecule was unlikely. Less than 10% of the TRR remained unextracted. The total recovery of residues in the extracts used for characterization was about 90% of the TRR and the unextractable residue contained about 5%.

Table 15. Radioactive residues in grapes treated with phenoxy- and phenyl-labelled [^{14}C]kresoxim-methyl (mg/kg as parent equivalents based on weight of unwashed grapes).

Sample	Phenoxy label		Phenyl label	
	% of TRR	mg/kg	% of TRR	mg/kg
Methanol rinse	34.7, 40	1.32, 1.60	32.1, 40.5	1.13, 1.91
Homogenized rinsed grapes	65.3, 60	2.51, 2.40	67.9, 59.5	2.49, 2.81
TRR	100	3.83, 4.00	100	3.62, 4.72

Table 16. Fractionation of radioactive residues in grapes treated with phenoxy- and phenyl-labelled [^{14}C]kresoxim-methyl.

Sample	Phenoxy label		Phenyl label	
	Acetone/water	Methanol, mean %	Acetone/water	Methanol, mean %
TRR, mg/kg	3.83	3.94	3.62	4.35
% in rinse	34.7	38.2	32.1	37.7
% in homogenized grapes	52.4	50.7	56.7	52.0
% of TRR extracted	87.1	88.9	88.8	89.7
% unextractable	4.3	6.3	4.5	5.8
% of TRR recovered	91.4	95.1	93.3	95.5

Parent kresoxim-methyl was the main residue, 55.38% of the phenoxy TRR and 57.35% of the phenyl (Table 17). The alcohol-acid 490M2 was also prominent at 13.76% and 8.86% of the TRR (sum of free and conjugated). After β-glucosidation, levels of the phenolic acid 490M9 were 5.75% and 4.38% of the TRR. Small amounts of free 490M9 were originally present, at 1.25% and 1.4% of the TRR. The enzymatic conversion of conjugates to aglycones by ß-glucosidase was 85-88%. Approximately 3.5% and 5% of the TRR remained unidentified as polar or conjugated metabolites. A mixture of over 20 unhydrolysed conjugates and other polar materials were individually below 0.05 mg/kg. Those from the phenyl label were unaffected by the additional hesperidinase hydrolysis.

There were no major qualitative differences between the two labels.

Table 17. Characterization of radioactive residues in grapes treated with phenoxy- and phenyl-labelled [^{14}C]kresoxim-methyl.

Identity	phenoxy label		phenyl label	
	%TRR	mg/kg	%TRR	mg/kg
Unknown polar			0	0
Unknown polar			0.59	0.027
Unknown polar			1.40	0.066
Unknown polar	0.56	0.023	0.28	0.013

Identity	phenoxy label		phenyl label	
	%TRR	mg/kg	%TRR	mg/kg
Conjugate	3.18	0.127	2.78	0.130
490m2[1]	13.76	0.550	8.86	0.418
490m9[1]	5.75	0.230	4.38	0.206
490m54[1]	2.07	0.083	1.37	0.064
490M1[1] (acid)	0.48	0.019	0.13	0.006
Unknown	0.72	0.029	0.83	0.039
Unknown	1.03	0.041	1.11	0.052
Parent	55.38	2.215	57.35	2.707
Z-isomer	3.49	0.139	3.75	0.177
Unknown	0.58	0.023	0.42	0.019
(Background	3.70	0.148	2.98	0.140)
Total	90.70	3.63	86.23	4.07

[1]Sum of free and conjugated

Rotational crops. In trials in Germany during 1992/93 (Hoffmann, 1993a,b; Grosshans, 1994d) [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity 97-99%), was applied to bare soils at 0.3 kg/ha. After ageing for 30 days, the soils were diluted with untreated soil in the ratio of 1:9 in order to simulate ploughing. 30 days later spring wheat (Star, Ralle varieties), green beans (Maxi, Marona), carrots (Nantaise Frühbund) and lettuce (Ultra, Ovation) were sown or planted. Crops were harvested at interim stages to identify metabolites (as the final harvest samples would contain low levels of residues) and at maturity. Samples were stored at -18°C before analysis by combustion and LSC. The samples were apparently not washed before analysis.

The samples were extracted with methanol and then with dilute aqueous ammonia. The extractable radioactivity was separated by liquid/liquid partition (cyclohexane/ethyl acetate/water) and HPLC. Conjugates were cleaved by enzymes (hesperidinase and β-glucoside) and the structures of isolated metabolites and aglycones elucidated by chromatographic comparison with reference compounds.

The highest total radioactive residues found in the crops at harvest in mg/kg were 0.15 in wheat straw, 0.007 in wheat grain, 0.21 in bean forage, 0.009 in green beans, 0.006 in carrot roots, 0.047 in carrot foliage and 0.01 in lettuce heads (Table18). Methanol extracted 57 to 77% of the TRR and the subsequent dilute aqueous ammonia extraction released additional 20% to 34%. The total extraction was >85% of the TRR.

Table 18. The distribution of radioactivity in rotational crops after treatment of soil with 0.3 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl. (Measured and calculated TRR, parent equivalents).

Sample	Type	Days after sowing or planting	TRR[1], in crops, mg/kg equiv	TRR[2], in crops, mg/kg equiv	TRR (column 4) as % of initial radioactivity in soil (mean 0.93 mg/kg)
Soil	initial		0.918, 0.83, 1.05		
Soil	after 30 days ageing		0.05, 0.066, 0.06		6.3
Wheat forage	interim	42, 61	0.067, 0.232	0.05	
Wheat straw	final harvest	124, 125	0.119, 0.068	0.077-0.146	10.0
Wheat grain	final harvest	124, 125	0.006, 0.007		0.7
Soil	final harvest	124, 125	0.050, 0.029		4.2
Green beans (pods)	interim	26, 56, 75	0.36, 0.004, 0.004	0.057-0.195	
Green beans (beans plus pods)	final harvest	77	0.009		1.0

Sample	Type	Days after sowing or planting	TRR[1], in crops, mg/kg equiv	TRR[2], in crops, mg/kg equiv	TRR (column 4) as % of initial radioactivity in soil (mean 0.93 mg/kg)
Bean forage	final harvest	77	0.21		22.6
Soil	final harvest	77	0.042		4.5
Carrots (plant)	interim	50	0.025	0.026	
Carrots (foliage)	interim	52, 90	0.061, 0.010		
Carrots (roots)	interim	52, 89, 90	0.052, 0.005, 0.003		
Carrots (foliage)	final harvest	111	0.047	0.035	5.0
Carrots (roots)	final harvest	111	0.006		0.6
Soil	final harvest	111	0.036		3.9
Lettuce (leaves/head)	interim	26, 30, 49, 56	0.053, 0.051, 0.02, 0.028	0.03-0.032	
Lettuce (head)	final harvest	66	0.010		1.0
Lettuce (roots)	final harvest	66	0.231		24.8
Soil	final harvest	66	0.032		3.4

[1]Measured by combustion
[2]Sum of extractable and unextractable radioactivity

In extracts of bean forage, carrot forage and lettuce conjugates were the main radioactive residues, accounting for about 30-40% of the TRR. Enzymatic treatments of the extracts and/or isolated conjugate fractions produced mainly the aglycones 490M2 and 490M9. The rest of the extractable radioactivity in these samples gave rise to several radioactive peaks representing up to 0.043 mg/kg (22% of the TRR). Mature lettuce also contained 9.4% of the TRR (0.003 mg/kg) as the unchanged parent compound and carrot forage 12.7% (0.005 mg/kg) as 490M1.

Wheat straw contained small amounts of the free hydroxy metabolites 490M2 and 490M9 (together about 10% of the TRR). Enzyme treatment produced 4.8% of the TRR as 490M2 and 10.4% as 490M9. The parent compound was detected in straw at 1.5% of the TRR (0.001 mg/kg). The results are shown in Table 19.

The results shown in Table 18 suggest that there is a slight uptake from soil into the crops, particularly wheat straw, bean forage and lettuce roots. Wheat straw and lettuce heads contained the parent compound at 0.15% and 0.09% of the initial radioactivity in the soil (Hofmann, 1993a,b; Grosshans, 1994d).

Table 19. Characterization of radioactivity in rotational crops after treatment of soil with 0.3 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl. Where two figures are shown they are the results of separate uptake studies.

HPLC Peak	Identity	Wheat straw		Wheat forage		Bean forage		Carrot forage		Lettuce	
		mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
1				0.003	6.0	0.002, 0.001	0.9, 1.4			0.003	8.9
2		0.01	7.6					0.0015	5.7		
3		0.001	0.9							0.0005	1.8
4		0.001	1.2			0.001	1.3	0.003	8.6		
5				0.009	17.1	0.043, 0.008	21.9, 13.4	0.002	6.9	0.001, 0.0006	4.2, 1.9
6		0.006	7.8								
7		0.001	1.1	0.003	6.3						

HPLC Peak	Identity	Wheat straw		Wheat forage		Bean forage		Carrot forage		Lettuce	
		mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR
8		0.021	16.0			0.017, 0.001	8.5, 2.4				
9		0.017, 0.004	13.2, 4.8	0.005	10.9						
10	unknown	0.034, 0.01	26.5, 12.5	0.017	33.5	0.008, 0.004	4.2, 6.8	0.0007, 0.001	2.0, 3.2		
11		0.003	3.8								
12	conjugates	0.015, 0.004	11.6, 5.2								
13	conjugates	0.003	3.7	0.002	4.5	0.071, 0.018	36.7, 30.9	0.015, 0.004	43.6, 13.9	0.012, 0.015	41.5, 50.8
14		0.001	1.8			0.007, 0.008	3.4, 14.3	0.002, 0.004	5.7, 14.5	0.004	12.7
15						0.015, 0.002	7.7, 3.6				
16											
17								0.0003	1.1		
18	490M2	0.011, 0.001	8.5, 1.6								
19	490M9	0.0014	1.8							0.0006	2.1
20											
21		0.0008	1.1					0.0002	0.8		
22	409M1			0.001	1.5			0.004	12.7		
23		0.001	1.4								
24	Parent	0.001	1.5							0.003	9.4
25	(*Z*)-isomer										

Metabolic pathways in plants

The pathways proposed by the manufacturer for the metabolism of kresoxim-methyl in apples, wheat and following crops and in grapes are shown in Figures 10 and 11 respectively.

The manufacturer concludes that conjugates of 490M-2 and 490M-9 are incorporated into the starch and protein of wheat grain and the lignin of straw, and are further incorporated as bound residues in following crops.

Summary of metabolism

A total of 53 metabolites or degradation products of kresoxim-methyl have been identified in studies with rats, hens, goats, apples, wheat and grapes. A number of these have been identified in domestic animals and crop plants but not in rats: 16 in hens, 3 in goats and 1 in grapes.

Of these, only two are likely to occur in food commodities at significant levels (>0.05 mg/kg). These are 490M18, which was found at significant levels in several tissues in goats, and 490M54 which was found at significant levels in grapes. 490M18 is a postulated intermediate in rats.

The code names and chemical structures of the metabolites and degradation products are given in Figure 12 (at end of evaluation).

Environmental fate in soil and water/sediment systems

All the studies were carried out according to national or international guidelines and GLP.

Laboratory soil degradation studies

(a) In a study according to BBA guidelines Limbergerhof sandy loam soil was treated with [*phenoxy*-^{14}C]kresoxim-methyl (radiochemical purity (*Z*)- + (*E*)-isomers 100%, 0.5 mg/kg) and incubated at 40% maximum water holding capacity in the dark at 20°C. Volatile compounds were trapped in ethylene glycol, 0.5M H_2SO_4 and 0.5M NaOH. Soil samples were taken at nine intervals during 183 days and extracted with methanol and methanol/water. After clean-up the extracts were analysed by LSC and TLC and the identities of the compounds confirmed by HPLC and MS.

Recoveries were >92% of the applied radioactivity (AR) for the first 63 days but subsequently dropped to about 80% of the AR, which was attributed to loss of CO_2 and sorption of radioactivity to the filter paper during extraction. The degradation of kresoxim-methyl was very rapid (DT90 <3 days) and the free acid 490M1 reached 84% of the AR. This was subsequently degraded with a first-order half-life of 38 days. At the end of the experiment cumulative CO_2 production reached 27% of the AR whilst bound residues had reached a plateau of 47%. The bound residues were further examined and most of the radioactivity was found in the humin fraction. The only other compound identified during the experiment was 490M0 (the (*Z*)-isomer of kresoxim-methyl) and levels of this were very low in comparison with 490M1. No other compound exceeded 2.5% of the AR (Kellner, 1994a).

(b) In a study according to EPA guidelines Holly Springs sandy loam soil was treated with [*phenoxy*-^{14}C]kresoxim-methyl (radiochemical purity 95% (*E*)-isomer, >99% (*E*)- + (*Z*)- isomers, 0.5 mg/kg) and incubated at 75% water content in the dark at 20°C. Volatile compounds were trapped in ethylene glycol and 0.5M NaOH. Soil samples taken at nine intervals during 363 days were extracted and analysed as above.

Recoveries of radioactivity were 73-100% of the AR. Further work showed that the missing radioactivity was recoverable from the filter paper and was from the same compounds as in the main extract. The degradation of kresoxim-methyl was very rapid (DT90 about 2 days). The free acid 490M1 reached 66% of the AR and was subsequently degraded with a first-order half-life of 131 days. At the end of the experiment the cumulative CO_2 represented 2% of the AR. Bound residues reached a peak of 41% of the AR at day 272 and then decreased. Small amounts of the diacid 490M4 (max 3.3% of the AR) and 490M0 (4.4% of the AR) were also detected (Kellner, 1994b).

(c) This study was similar to (a), but the Limbergerhof sandy loam soil was treated with phenyl-labelled kresoxim-methyl (radiochemical purity >99%, 0.5 mg/kg). Volatile compounds were trapped in ethylene glycol and 0.5M NaOH. Soil samples were taken at ten intervals during 181 days and extracted and analysed as before.

Recoveries of radioactivity were >91% of the AR. The degradation of kresoxim-methyl was again very rapid (DT90 about 2 days). The free acid reached 81% of the AR before degradation with a first-order half-life of 57 days. The cumulative production of CO_2 was 43% of the AR. Bound residues reached a plateau of 36% of the AR with most of the radioactivity in the humin fraction. Other unidentified compounds reached a maximum of 1.6% of the AR (Kellner, 1994c).

(d) In a study according to BBA and Danish guidelines Speyer 2.2 sandy loam, Limbergerhof sandy loam, Limbergerhof clay loam and Versuchsstation sandy loam were treated with kresoxim-methyl (0.5 mg/kg) and incubated at 40% maximum water holding capacity in the dark at 20°C. Samples of the Limbergerhof sandy loam were also incubated under the same conditions at 0.05 mg/kg, and at 0.5 mg/kg with soil at 20 and 60% maximum water holding capacity and at 10 and 30°C. Soil samples taken at six intervals during 100 days were extracted by refluxing with buffered aqueous alkaline solution to hydrolyse the ester. After clean-up the acid was quantified by GLC. The mean

recovery was 83% and the limit of determination 0.005 mg/kg. First-order half-lives for the combined parent ester and acid are shown in Table 20.

Table 20. First-order half-lives of the combined kresoxim-methyl and its free acid metabolite (Keller 1993a).

Soil	Application rate, mg/kg	Temp., °C	% of max. water holding capacity	Half-life, days
Speyer 2.2 (sandy loam)	0.5	20	40	59 (r^2=0.95)
Limbergerhof (clay loam)	0.5	20	40	425 (r^2=0.25)
Versuchsstation (sandy loam)	0.5	20	40	22 (r^2=0.98)
Limbergerhof (sandy loam)	0.5	20	40	25 (r^2=0.99)
Limbergerhof (sandy loam)	0.5	20	20	192 (r^2=0.87)
	0.5	20	60	24 (r^2=0.99)
	0.5	10	40	122 (r^2=0.98)
	0.5	30	40	22 (r^2=0.94)
	0.05	20	40	20 (r^2=0.98)

(e) This study complied with Danish criteria. Limbergerhof sandy loam soil treated with 0.5 mg/kg [*phenoxy*- ^{14}C]kresoxim-methyl (radiochemical purity (*E*)- + (*Z*)- isomers >99%, (*Z*)-isomer about 5%) was incubated at 40% maximum water holding capacity in the dark at 20°C under a stream of nitrogen. Anaerobic conditions were regularly checked. Volatile compounds were trapped in ethylene glycol, 0.5M H_2SO_4 and 0.5M NaOH. Soil samples taken at seven intervals during 100 days were extracted and analysed as before.

Recoveries of radioactivity were 85-98% of the AR; the losses could be accounted for by sorption to filter paper during the extraction procedure. The degradation of kresoxim-methyl was very rapid (DT90 <3 days). The free acid 490M1 reached a maximum of 84% of the AR, but its subsequent degradation was too slow to calculate a half-life. At the end of the experiment the cumulative CO_2 accounted for 2.6% of the AR and bound residues for 20%. No other volatile compounds were detected (Kellner, 1993a).

(f) In a companion study Limbergerhof sandy loam soil was sterilized, treated with [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity >98%, (*Z*)-isomer about 2%) at 0.5 mg/kg and incubated at 40% maximum water holding capacity in the dark at 20°C. Soil samples taken at five intervals during 181 days were analysed.

Recoveries of radioactivity were 87-120% of the AR. Kresoxim-methyl was so slowly degraded that after 181 days 68% was still present (degradation was too variable to calculate a half-life). The free acid 490M1 and bound residues (up to 4.8% of the AR) accounted for the remaining radioactivity. CO_2 was not measured (Kellner, 1992).

Soil dissipation under field conditions

(a) In a study according to BBA guidelines kresoxim-methyl (300 g ai/ha) was applied to bare soil at four sites in Germany (Niederhofen clay loam, Birkenheide sandy loam, Oberding clay loam and Brockhausen clay loam) in May 1992. Twenty soil cores were taken from each site at 0, 14, 28, 60, 100 and 182 days. These were sectioned into 0-10 and 10-25 cm layers and corresponding layers combined. Samples were extracted with iso-octane/phosphate buffer (1:1) and analysed by GLC for kresoxim-methyl only or combined kresoxim-methyl and 490M1, with procedural recoveries of 110% and 79% respectively and a limit of determination of 0.01 mg/kg in both cases. The samples were stored up to 18 months before analysis and there was some degradation of kresoxim-methyl during this period. CLICK HERE to continue

Kresoxim methyl accounted for 17% (day 0), 31% (day 0), 19% (day 14) and 0% of the combined residues at Niederhofen, Birkenheide, Oberding and Brockhausen respectively. Hence extensive degradation had occurred even on day 0 and half-life and DT90 values could not be calculated for kresoxim-methyl owing to the low residues and few early samples (there were no detectable residues of kresoxim-methyl after 14 days). Half-lives and DT90 values for the combined residues of kresoxim-methyl and 490M1 in the 0-10 cm layer were estimated graphically and are shown in Table 21. In the 10-25 cm layer, small amounts (0.03 mg/kg) of 490M1 were detected at day 0 in two samples.

Table 21. Graphically estimated half-life and DT90 values for combined kresoxim-methyl and 490M1 in the 0-10 cm layers of four soils (Hesse *et al.*, 1994).

Site	Half-life, days	DT90, days
Oberding	38	125
Oberding	35	117*
Niederhofen	11	36*
Niederhofen	16	38
Birkenheide	8	18
Brockhausen	8	- **

* Assumed first order
**Concentration too low for estimation

A proposed degradation route of kresoxim-methyl in soil is shown in Figure 14.

Photolysis in soil

In a study according to US EPA guidelines Holly Springs sandy loam soil at 33 kPa moisture content was treated with 11.1 mg/kg [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity (*E*)-isomer 95, (*Z*)-isomer 3%) and irradiated with a xenon lamp with a spectral distribution and intensity similar to sunlight in North Carolina, USA, at 25°C. Volatile compounds were trapped in carbitol, 0.5 M H_2SO_4 and 0.5M NaOH. Soil samples taken at seven intervals during 360 hours of illumination were extracted with methanol and methanol/water and analysed by LSC and HPLC.

Throughout the experiment recoveries of radioactivity were 98-103% of the AR. After 15 days continuous irradiation volatile compounds from the illuminated samples reached 1% of the AR whilst those from the dark control were <0.01%. Unextractable residues rose to 4.9% of the AR in irradiated samples and 2.1% in dark controls. First-order half-lives for kresoxim-methyl were 35 days in irradiated soils and 6.7 days in dark controls. In the irradiated samples 490M1 reached a maximum of 7.4 % of the AR and then decreased to 2.4 % by the end of the experiment and eleven other unidentified compounds (each <5.2% of the AR) were detected during the incubation. In the dark controls, 490M1 reached 60.6% of the AR at the last sampling. Small amounts (<7.6% of the AR) of six unidentified compounds were present but these were different from those in the irradiated samples. 490M0 remained at a constant level of about 3-5% of the AR throughout the study in both the illuminated and dark samples (McKenna, 1994).

Adsorption and desorption in soil

The adsorption and desorption of kresoxim-methyl and the free acid were measured in two studies according to OECD guidelines. [*Phenyl*-^{14}C]kresoxim-methyl (specific activity 227 MBq/mmol, radiochemical purity (*E*) + (*Z*) isomers >99%) was dissolved in 0.01M $CaCl_2$ (0.008 µg/ml, 0.04 µg/ml, 0.2 µg/ml and 1.0 µg/ml) and duplicate 25-ml aliquots were added to four different soils (5g) and equilibrated for 1h. Radioactivity in the solutions was quantified by LSC. Soil from the 1 µg/ml

experiment was also extracted with methanol and 91-101 % of the AR was accounted for. The results are shown in Table 22.

Table 22. Freundlich adsorption constants for kresoxim-methyl in four soils.

Soils	K_d	1/n	K_{oc}
Speyer 2.1 (sand)	2.6	0.97	372
Speyer 2.2 (loamy sand)	7.7	0.99	338
Speyer 2.3 (sandy loam)	3.6	0.95	301
Limbergerhof Ost (clay loam)	5.9	0.99	219

TLC of selected samples showed that a significant proportion of the radioactivity in the soil and solution after the experiment was due to the free acid 490M1. When two desorption steps, each of 16 h, were carried out 75-81% of the adsorbed radioactivity was desorbed (Keller, 1992).

In the second study [*phenyl*-^{14}C]490M1 (specific activity 101 MBq/mmol, radiochemical purity (*E*)- + (*Z*)-isomers 93%) was dissolved in 0.01M $CaCl_2$ (0.008 µg/ml, 0.04 µg/ml, 0.2 µg/ml and 1.0 µg/ml) and duplicate portions of 5 ml added to 1 g of the same four soils were equilibrated for 2 h. Radioactivity in the solutions was quantified by LSC. Soil samples equilibrated at 1 µg/ml were extracted with methanol and a recovery of 95-101% of the AR was obtained. The results are shown in Table 23.

Table 23. Freundlich adsorption constants for 490M1 in four soils.

Soils	K_d	1/n	K_{oc}
Speyer 2.1 (sand)	<0.1		
Speyer 2.2 (loamy sand)	0.62	0.94	24
Speyer 2.3 (sandy loam)	<0.1		
Limbergerhof Ost (clay loam)	0.55	0.91	17

TLC of selected samples showed that all the radioactivity in the aqueous solution after 24 h agitation was due to 490M1. Only 2.8-10% was sorbed to soil and almost all was desorbed after two desorption steps of 16 h (Keller, 1993b).

Mobility in soil (column leaching).

Four studies were carried out according to BBA guidelines, all with glass columns 30 cm by 5 cm i.d. filled with untreated soil and saturated with water from below. Duplicate columns were filled with Speyer 2.1, 2.2 or 2.3 soil and formulated kresoxim-methyl (BAS 490 04 F, 29.4 µg ai) was added to the tops of the columns which were leached with water (393 ml, equivalent to 200 mm rain) for 2 days. The leachates were analysed for combined kresoxim-methyl and 490M1 by GLC after alkaline hydrolysis. The proportions of the combined parent and acid in the leachates were 73.1-76.9%, <0.2-0.8% and 33.2-40.8% from the Speyer 2.1, 2.2 and 2.3 soils respectively (Keller, 1993c).

The second study was with the same soils. Formulated BAS 492 01 F containing kresoxim-methyl (20.6 µg ai) and fenpropimorph (41.2 µg ai) was added and the columns leached with water (393 ml, equivalent to 200 mm) for 2 days. The leachate was analysed for combined kresoxim-methyl and 490M1 as before and for fenpropimorph. The leachates contained 62.2-99.1%, 1.6-2.6% and 53.4-58.8% of combined kresoxim-methyl and acid from the Speyer 2.1, 2.2 and 2.3 soils respectively, and <0.8% of the fenpropimorph in all cases (Keller, 1994a).

The third study was identical except that formulated BAS 494 02 F containing kresoxim-methyl (24.5µg ai) and epoxiconazole (amount not stated) was added to the columns. The leachates

from the 2.1, 2.2 and 2.3 soils contained 41.2-48%, 14.7-24.3% and 43.3-62% of the combined ester and acid, and <0.2% of the epoxiconazole in all cases (Keller, 1994b).

In the fourth study Speyer 2.1 soil treated with [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity >99%, 0.5 mg/kg) was adjusted to 40% maximum water capacity and incubated in the dark at 20°C for 30 days with traps to collect volatile compounds. Samples of soil were extracted with acetonitrile/water and analysed by HPLC. Duplicate portions of the aged treated soil (113 g) were added to columns of the untreated soil which were leached with 200 mm water (393 ml) for 2 days. A similar experiment was undertaken with unaged soil.

Soil samples were extracted with methanol and methanol/water and water samples were acidified and partitioned with ethyl acetate. All extracts were then analysed by LSC and TLC.

In the unaged sample 40.2-56.1% of the AR was found in the leachate, mainly from 490M1. In the aged sample before leaching, 60% of the AR was extractable and most of this was due to 490M1, with small amounts of kresoxim-methyl and a more polar product. Unextractable residues accounted for 24.5% of the AR and volatile compounds for 4.5%. After leaching 56.7-58.4% of the AR was found in the leachate, mainly from 490M1. Of the 44-45% retained in the column, 26.1-30.7% of the AR was in the top 5 cm (Keller, 1991).

Mobility in soil (field leaching)

In a study according to BBA guidelines an SC formulation of [*phenoxy*- ^{14}C]kresoxim-methyl (radiochemical purity (*E*)- + (*Z*)-isomers 98.4%, 150 g ai/ha) was applied on 1 April and 4 May 1992 at Limbergerhof, Germany, to triplicate lysimeters (1 m² surface area, 1.2 m depth) containing Schifferstadt loamy sand in which barley was growing (growth stages 30/31 at the first application and 49/51 at the second application). In one of the lysimeters two further applications of 150 g ai/ha were made to winter wheat in April and May 1993 and a subsequent crop of oilseed rape was planted on 24 August 1993.

The lysimeters received 813 mm and 825 mm precipitation (rainfall + irrigation) in years one and two respectively. Leachate was collected regularly and except in one sample in June 1992 no leaching of radioactivity occurred before October of each year. Total radioactivity and $^{14}CO_2$ were measured and the nature of the remaining radioactivity was investigated. Where application was only in 1992 a total of 0.66-0.67% of the AR was leached over two years (mean concentration 0.4 µg/l). Where application was in 1992 and 1993, a total of 0.88% of the AR was leached over two years (mean concentration 0.62 µg/l). In all the lysimeters most of the radioactivity was in very polar unidentified fractions whilst CO_2 accounted for 0.03-0.09% of the AR. Kresoxim-methyl was not found (<0.01 µg/l) in any leachate sample. The annual average content of 490M1 was <0.01-0.04 µg/l and the highest individual concentration was 0.08 µg/l in April 1993.

At the end of the experiment the soil from one of the lysimeters treated in 1992 only was sectioned and the remaining radioactivity determined by combustion analysis. The whole profile contained 33.7% of the AR, and 25.9% of the AR was in the top 20 cm in which kresoxim-methyl concentrations were 0.38-0.79 µg/kg and 490M1 concentrations 0.25-0.33 µg/kg (Hamm, 1994).

Aqueous hydrolysis

In a study complying with EPA guidelines [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity (*E*)- + (*Z*)-isomer >98%, (*Z*)-isomer about 7%) was added to sterile buffer solutions at pH 5, 7 and 9 (0.23 mg/l) which were incubated at 25°C in the dark for periods up to 30 days and subsequently analysed by TLC. Recoveries were 97-106% of the AR and 490M1 was the only product. The first-order half-lives of kresoxim-methyl were 875, 34 and 0.29 days at pH 5, 7, and 9 respectively (Bieber 1992).

Aqueous photolysis

In a study according to BBA guidelines the absorbance in methanol was measured between 290 and 800 nm. There was little or no absorption above 340 nm, but at 292.5 nm the absorbance was 378 mol^{-1} cm^{-1} (Sarafin 1992a).

The quantum yield for kresoxim-methyl was determined over the range of incubation times. It varied with the duration of irradiation, which the author considered to show that the photoproducts were also absorbing. Quantitative details of the photoproducts obtained were not provided but compound 490M0 was detected (Sarafin 1992b).

In a study according to EPA guidelines [*phenyl*-^{14}C]kresoxim-methyl (radiochemical purity (*E*)-isomer 99.3%) was dissolved in sterilized 0.01M acetate buffer at pH5 (2 mg/l) and irradiated at 25°C with a xenon light source. The intensity of the source was the same as measured in December 1993 in North Carolina, USA, and wavelengths below 290 nm were filtered out. Samples were collected at six intervals during 370 h irradiation (volatile compounds were collected in appropriate traps) and analysed by LSC, HPLC and LC-MS.

The recovery of ^{14}C for all samples was 90-99% of the AR and no degradation occurred in the dark controls. After 370 h irradiation a total of 0.16% of the AR was found in the trapping solutions and six unknown compounds were detected in the main solution, none of which accounted for >5% of the AR at any time. The first-order half-life of kresoxim-methyl was calculated to be 716 h (r^2=0.9) (Goetz 1994).

The photolysis of 490M1 was studied in natural pond water (pH 8, 10 mg/l) and pure water (10 mg/l) irradiated at 20°C with a xenon light source. The intensity of the source was 3.0 mW/cm², which was stated to be consistent with the natural sunlight intensity on a clear sunny day, presumably in Germany, and wavelengths below 290 nm were filtered out. Samples were collected at six intervals during 15 days irradiation and compared with dark controls. Analysis was by HPLC and LC-MS.

No degradation of 490M1 took place in pond water stored in darkness for 15 days, but when the compound was irradiated in pure water and natural water, first-order half-lives were 37 days and 19 days respectively. In the natural water sample an additional compound occurred during irradiation which was found to be phthalic acid, but the author concluded that this was not likely to be formed by degradation of 490M1.

The absorbance spectra of the natural water solution were measured before and after irradiation and the absorbance was found to be lower at all wavelengths after irradiation, showing a consumption of potential photosensitizing compounds during the study period (Scharf, 1994).

Biodegradability

In studies complying with OECD guideline 301D the biodegradabilities of kresoxim-methyl and 490M1 were investigated using sewage plant effluent as the biological innoculum. Oxygen demand was found to be <20% and 0% respectively of the theoretical maximum values after 28 days, showing that neither kresoxim-methyl nor 490M1 is readily biodegradable under the conditions of the guideline (Lungershausen, 1993a).

Studies on the degradation of kresoxim-methyl in an aerobic aquatic environment (Beiber, 1993) and in air and the atmosphere (Sarafin 1993) were also submitted but not reviewed.

METHODS OF RESIDUE ANALYSIS

Analytical methods

Methods for plants, plant products and feeding stuffs, soil and water, and animal products are summarized in Tables 24-26. Methods and chromatograms were acceptable unless otherwise stated. Low recoveries of 490M2 and 490M9 from wheat straw were observed at the lowest fortification level of 0.05 mg/kg. Variable recoveries of metabolites (up to 22.4% RSD) and low recoveries of 490M1 and 490M2 were reported for fat at the lowest fortification level. RSDs up to 34.8% were reported for 490M2 in milk although for all fortification levels the RSD averaged 13.9%. No methods were reported for residues in poultry products.

Table 24. Analytical methods and their validation for plants, plant products and feeding stuffs.

Sample	Analyte	Extraction	Partition, clean-up	Quantification	LOD, mg/kg	Spike, mg/kg	Mean recoveries %	RSD, % (n)	References
Apple, Wheat straw, wheat grain	Parent	methanol and KH_2PO_4	iso-octane, SPE silica gel, SPE C18	GC-ECD	0.05	0.05-5.0	92.8-105.5 92.4 87.5-96.5	6.4 (10). 18.4 7.8 (8)	Krotzky & Dams 1993; Schulz 1994a
Apple, Cereal straw, cereal grain Forage	Parent	aqueous methanol and KH_2PO_4	iso-octane, SPE silica gel, SPE C18	GC–MS and GC–ECD	0.05	0.05-5.0	79.3-93.8 91.8-111 97.9-98.5 104-106	5-7 (16). 7.6-11.2 (8). 12-16.4 (8). 5.6-9.2 (8)	Mackenroth & Krotzky 1994a
Apple	Parent	As above	As above	GC – ECD	0.05	0.05-5.0	103-109	7-9 (8)	Wayman 1994a
Wheat grain Apple[3]	Parent	acetone /water	sodium chloride/ dichloromethane, GPC (Bio Beads S-X3), silica gel	GC – ECD	0.01	0.01-0.1	100-101 99-100	0.7-1.4 (4). 2.1-3.5 (4)	Schmidt *et al.* 1994
Wheat forage Wheat straw	Parent 490M2 490M9 Parent 490M2 490M9	sequential aqueous methanol, aqueous ammonia/ methanol.	Iso-octane SPE silica gel, SPE C18 (parent only). Ethyl acetate/MTBE[2], enzyme hydrolysis (glucosidase, hesperinidase) with ascorbic acid, partition -dichloromethane, SPE NH2, HPLC RP-C18 (metabolites only).	GC – ECD or MS (parent). HPLC-UV (270 nm)	0.01[1] 0.05 0.05 0.01 0.05 0.05	0.05-5.0	89.2-104.1 74.9-89.4 78.8-84.5 91.8-111 61.8-73.7 60.7-73.4	1.8-9.2 (8). 2.8-8.7 (8). 3.2-6.6 (8). 7.6-11.2 (8). 7.6-12.6 (8). 8.6-12.7 (8)	Krotzky & Dams 1994a
Cereal plant Cereal grain Cereal straw	Parent 490M2 490M9 Parent Parent 490M2 490M9	As above	As above	As above	0.05	0.05-5.1 0.05-5.5 0.06-6.1 0.05-5.1 0.05-5.1 0.05-5.3 0.05-5.3	77-81 80-89 84 82-98 74-97 92-96 96-98	4.2-11 (8). 6-11 (8). 11 (8). 4.4-13 (8). 2.3-2.9 (8). 3.2-12 (8). 6-16 (8)	Flintham & Gillis 1994

[1]LOD quoted as 0.01 mg/kg, but lowest validation was 0.05 mg/kg
[2]Methyl *tert*-butyl ether
[3]Proposed for post-approval monitoring

Table 25. Analytical methods and their validation for soil and water.

Sample	Analyte	Extraction	Partition, clean-up	Quantification	LOD, mg/kg	Spike, mg/kg	Mean recoveries %	RSD, % (n)	References
Soil	Parent	KH_2PO_4 buffer/iso-octane	SPE silica gel	GC-MS	0.01	0.01-1.05	86.3-91.4	5.2-5.5 (8)	Mackenroth & Krotzky 1994b
Soil	Parent	As above	As above	GC-ECD	0.01	0.01-1.0	74.3-75.7	9-13 (8)	Wayman 1994b
Soil	Parent & 490M1, expressed as parent	KH_2PO_4 buffer	SPE Extrelut/ethyl acetate, SPE C18, esterification of 490M1 with methanol/H_2SO_4, further SPE C18	GC-ECD	0.01	0.01-1.0 0.01-1.0	66.3-76.1 71.9-83.6	9.8 (4). 0.8-9.2 (20)	Krotzky 1994a
Soil	Parent & 490M1, expressed as parent	As above	As above	As above	0.01	0.01-1.0 0.01-1.0	75-95.3 77.8-84.8	10.2-12.3(8). 8.6-10.3 (8)	Nigel & Matthew 1994
Water	Parent & 490M1, expressed as parent	Hydrolysis with NaOH, extraction of free acid on SPE C18	Esterification to parent with methanol/H_2SO_4, further SPE C18.	GC-ECD or MS.	0.05 µg/l	0.05-5.0 µg/l	73-75.9 80.2-97.2	3.0-3.4 (4). 6.3-8.7 (12)	Krotzky 1994b
Air	Parent 490M1	Tenax adsorbant, acetone extraction	Re-dissolved in acetonitrile	HPLC (Nucleosil C18)-UV (254 nm)	0.004 µg/l	0.004-0.407 0.004-0.377	75.8-93.7 86.6-96.6	7.4-10.8 (8). 4.2-9.1 8)	Sarafin 1994

Table 26. Analytical methods and their validation for animal products.

Sample	Analyte	Extraction	Partition, clean-up	Quantification	LOD, mg/kg	Spike, mg/kg	Mean recoveries %	RSD, % (n)	Ref.
Milk	490M2 490M9	acetone, extract centrifuged, (protein precipitated), addition of ascorbic acid and phosphate buffer	Iso-octane & DCM partitioning, SPE-NH_2, further DCM partition.	HPLC (NH_2,/ C18)-UV (270 nm)	0.001	0.001-0.025 0.001-0.025	88.3-108.3 93.0-100.3	4.8-4.9 (8) 2.3-5.8 (8)	Krotzky & Dams 1994b.
Milk	490M2 490M9	As above	As above	As above	0.002	0.001-0.1 0.001-0.1	68.4-96.5 83.5-91.0	2.4-34.8(12) 3.0-8.4 (12)	Maxwell 1994
Muscle	490M1 490M2	methanol, filtration	$Ca(OH)_2$-precipitation of non-polar compounds, dichloromethane partition, SPE NH_2, HPLC RP C18.	HPLC (NH2/CN)-UV (270nm)	0.01	0.01-1.0	83.6-88.9 88.4-88.7	2.5-21.2 (8) 2.8-7.4 (8)	Mackenroth Krotzky 1994c
Muscle	490M1 490M2	As above	As above	As above	0.01	0.01-1.0	88.0-94.7 80.9-95.7	4.4-4.7 (8) 10.2-11.0(8)	
Fat	490M1 490M2 490M9	As above	As above	As above	0.01	0.01-1.0	55.9-82.2 53.1-84.1 61.8-88.5	5.6-8.2 (8) 4.8-12.2 (8) 1.9-9.1 (8)	Mackenroth Krotzky 1994c
Fat	490M1 490M2 490M9	As above	As above	As above	0.01	0.01-1.0	63.9-81.3 64.7-89.0 72.2-108.7	13.3-22.4(8) 16.7-21.9(8. 18.2-21.9(8)	Maxwell 1994
Kidney	490M1 490M2 490M9	As above	As above	As above	0.01	0.01-1.0	79.5-97.4 80.4-91.0 82.1-109.4	6.2-17.4 (8) 4.5-6.5 (8) 3.4-3.9 (8)	Mackenroth Krotzky 1994c
Kidney	490M1 490M2 490M9	As above	As above	As above	0.01	0.01-1.0	81.0-82.4 76.3-91.5 81.7-85.0	5.2-15.6 (8) 6.2-8.8 (8) 10.4-16.7(8)	Maxwell 1994
Liver	490M1 490M9	As above	As above	As above	0.01	0.01-1.0	76.6-83.8 71.5-102.1	2.2-16.7 (8) 0.7-5.5 (8)	Mackenroth Krotzky 1994c
Liver	490M1 490M9	As above	As above	As above	0.01	0.01-1.0	73.6-74.8 82.6-97.1	2.5-7.9 (8). 6.4-17.8 (8)	Maxwell 1994

Stability of pesticide residues in stored analytical samples

(a) Trials with [^{14}C]kresoxim-methyl

Apples. Storage stability was determined in the apple metabolism study. After six applications of 0.4 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl. to leaves, samples of peel were stored up to 14 months at -18°C before being extracted with methanol and analysed by HPLC and TLC. There was no marked change in the nature of the radioactive residues during storage as shown in Tables 27 and 28 (Hofmann, 1992a-c; Grosshans, 1994).

Table 27. Extractability of radioactivity from apple peel before and after storage, treated with phenyl-labelled [^{14}C]kresoxim-methyl.

	Before storage		After storage	
	mg/kg	% of TRR	mg/kg	% of TRR
TRR (E+R)	1.577	100.0	1.865	100.0
MeOH extract (E)	1.499	95.1	1.783	95.6
Extraction residue (R)	0.078	4.9	0.082	4.4

Table 28. Composition of radioactivity in extracts of apple peel before and after storage.

HPLC peak no.	Identity	Before storage % of TRR	After storage at -18°C % of TRR	Extract at end of study, not stored % of TRR
A6	2.0	2.2	2.2	
A7	conjugates	6.3	9.2	8.3
A8	490Ml	3.9	3.6	3.6
A9		2.8	2.6	2.5
A10	parent	79.8	78.7	77.0
All	(*Z*)-isomer	5.2	2.5	4.1

Wheat. Storage stability data were available from the wheat metabolism study. After two applications of 0.4 kg/ha phenyl-labelled [^{14}C]kresoxim-methyl. to wheat, straw samples were stored at -18°C before being extracted with methanol. There was no marked change in the composition of the radioactive residues during 21 months storage as shown in Tables 29 and 30 (Hofmann, 1991a,b; Grosshans, 1994).

Table 29. Extractability of radioactivity from wheat straw before and after storage, after treatment with phenyl-labelled [^{14}C]kresoxim-methyl.

	Before storage		After storage	
	mg/kg	% of TRR	mg/kg	% of TRR
TRR (E+R)	44.84	100	58.23	100
MeOH extract (E)	39.38	87.8	50.93	87.5
Extraction residue (R)	5.46	12.2	7.29	12.5

Table 30. Composition of radioactivity in extracts of wheat straw before and after storage.

TLC peak no.	Rf	Before storage % of TRR	After storage at -18°C % of TRR	Extract from end of study (not stored) % of TRR
1	origin	9.1	9.0	8.3
2	Rf of 490M1	2.6	2.3	2.0
3	Rf of parent	88.4	88.7	89.7

Grapes. In the grape plant metabolism study, after five applications of 0.5 kg/ha phenoxy and phenyl-labelled [^{14}C]kresoxim-methyl. to grapes, samples were stored at or below 0°C up to 15 months before analysis. There were small qualitative and quantitative differences in the composition of the TRR after 8 months storage. The results are shown in Tables 31 and 32 (Nelsen *et al.*, 1995).

Table 31. Extractability of radioactivity before and after storage from grapes treated with phenoxy- and phenyl-labelled [^{14}C]kresoxim-methyl.

	Phenoxy label				Phenyl label			
	Before storage		After 8 months storage		Before storage		After 8 months storage	
	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg	% of TRR	mg/kg
Acetone extract I	89.96	1.55	73.09	2.25	83.86	1.93	73.67	2.76
Acetone extract II	6.38	0.11	22.54	0.69	12.46	0.29	19.15	0.72
Unextracted	3.66	0.06	4.37	0.13	3.67	0.08	7.17	0.27
Total	100	1.73	100	3.07	100	2.30	100	3.75

Table 32. Composition of radioactive residues by TLC in extracts of grapes

	<30 days storage acetone/water extract, whole grapes	After 8 months storage at ≤0°C acetone/water extract, whole grapes	After 15 months storage at ≤0°C methanol extract, rinsed & homogenized grapes
% parent	68.32	75.01	58.4
% polar	15.81	18.04	23.6
% others	15.87	6.96	8.66

Poultry excreta and liver. Samples of excreta and liver from poultry treated with 180 mg/kg [^{14}C]kresoxim-methyl were stored at -18°C up to 21 months. The residues before and after storage are shown in Table 33. The extraction and composition of samples at the beginning and the end of the storage period showed comparable results (Burke, 1994; Grosshans, 1994c).

Table 33. Storage stability of residues in poultry samples taken after treatment of hens with [^{14}C]kresoxim-methyl.

Sample	Before storage		After storage		Reference
	% of TRR	mg/kg	% of TRR	mg/kg	
Liver		TRR = 6.90		TRR = 6.90	30942
Methanol extract	77.0	5.32	75.1	5.18	
Water extract	5.5	0.38	4.8	0.33	
Unextracted	17.5	1.21	20.1	1.39	
Excreta		TRR = 123		TRR = 113	30942
Methanol extract	84.3	103.7	85.0	96.5	
Unextracted	15.7	19.3	15.0	16.9	

Trials with unlabelled compounds

Crops. Apples, wheat grain, straw and forage were fortified with kresoxim-methyl, 490M2 and 490M9 at 1 mg/kg and stored at -20°C for 214 days. The stability of 490M2 and 490M9 was also determined in treated field samples. The results, corrected for procedural recoveries, are shown in Table 34.

Table 34. Storage stability of kresoxim-methyl and metabolites in wheat and apples.

Sample	Analyte	Type of residue	Storage period, days	Recovery, %	Reference
Grain	kresoxim-methyl	spiked	7	109.5	Krotzky 1994c
			30	91.3	
			93	98.3	
			214	104.9	
Straw	kresoxim-methyl	incurred	56	97.5	Krotzky 1994c
			91	100.3	
	490M2		56	96.5	
			91	109.8	
	490M9		56	53.3	
			91	142	
Forage	kresoxim-methyl	spiked	7	94.9	Krotzky 1994c
			35	97.8	
			168	86.2	
	490M2		35	-(<0.05 mg/kg)	
			168	-(<0.05 mg/kg)	
	490M9		35	96.7	
			168	108.7	
Apple	kresoxim-methyl	spiked	0	101	Mackenroth & Krotzky 1994d
			7	103	
			30	86.0	
			63	99.2	
			182	95.8	
			295	98.2	

Soil. Soil samples fortified separately with kresoxim-methyl and 490M1 at 0.5 mg/kg were stored at -20°C for one year. The residues found at intervals are shown in Table 35. The results were corrected for procedural recoveries.

Table 35. Storage stability of kresoxim-methyl and 490M1 added to soil at 0.5 mg/kg.

Analyte	Storage, months	Recovery, % (pH 6 soil)	Recovery, % (pH 8 soil)	Reference
kresoxim-methyl	0.5	82.6	99.0	Mann 1994
	1	87.0	101	
	3	86.1	101	
	6	73.9	78.6	
	12	72.2	76.7	
490M1	0.5	84.0	94.8	Mann 1994
	1	82.4	106.2	
	3	87.4	125.8	
	6	91.6	84.5	
	12	81.2	148.5	

USE PATTERN

Kresoxim-methyl was reported as being registered in many countries as shown in Tables 36-39. All the information was supplied by the manufacturer unless otherwise noted (BASF 1998, Regenstein 1998a-c).

Table 36. Registered uses of kresoxim-methyl on fruit (all field applications).

Commodity	Country	Form	Application			Max No[a]	PHI, days	Pest or disease, notes
			Spray conc., kg ai/hl	Water vol., l/ha	kg ai/ha			
Apple	Austria	WG	0.010	1000	0.100	6 (4)	35	ventura inaequalis
	Belgium	WG	0.007	1500	0.100	8 (4)	35	podosphaera leucotricha
	Belgium	WG	0.007	1500	0.100	8 (4)	35	venturia inaequalis
	Brazil	SC	0.01	1000	0.100	3	35	venturia inaequalis
	Chile	SC		1000	0.100	3	45	podosphaera leucotricha
	Chile	SC		1000	0.100	3	45	venturia inaequalis
	Chile	SC		1000	0.100	3	45	venturia pirina
	France	WG	0.010	1000	0.100	6 (4)	35	podosphaera leucotricha
	France	WG	0.010	1000	0.100	6 (4)	35	venturia inaequalis
	Hungary	WG	0.010	1000	0.100	4	35	podosphaera leucotricha
	Hungary	WG	0.010	1000	0.100	4	35	venturia inaequalis
	Israel	WG	0.008	1000	0.075		35	podosphaera leucotricha
	Israel	WG	0.008	1000	0.075		35	venturia inaequalis
	Italy	WG	0.005-0.007	1000		8 (4)	35	venturia inaequalis
	Italy	WG	0.005-0.007	1000		8 (4)	35	venturia pirina
	Japan	WG			1.880	3	30	alternaria mali
	Japan	WG			0.470	3	30	mycosphaerella pomi
	Japan	WG			0.470	3	30	podosphaera leucotricha
	Japan	WG			0.470	3	30	venturia inaequalis
	Netherlands	WG	0.010	1000	0.100	8 (4)	42	podosphaera leucotricha
	Netherlands	WG	0.010	1000	0.100	8 (4)	42	venturia inaequalis
	New Zealand	WG	0.005	2000	0.100	6	14	podosphaera leucotricha
	New Zealand	WG	0.005	2000	0.100	6	14	venturia inaequalis
	Norway	WG	0.01-0.015			4	21	podosphaera leucotricha
	Norway	WG	0.01-0.015			4	21	venturia inaequalis
	Poland	WG			0.100	6	35	podosphaera leucotricha
	Poland	WG			0.100	6	35	venturia inaequalis
	Poland	WG			0.100	6	35	venturia pirina
	Slovakia	WG	0.02			4		podosphaera leucotricha
	Slovakia	WG	0.02			4		venturia inaequalis
	South Africa	WG	0.007-0.01	500		6	45	podosphaera leucotricha
	South Africa	WG	0.007-0.01	500		6	45	venturia inaequalis
	Spain	WG	0.0075-0.010	1000	0.100	4	35	podosphaera leucotricha
	Spain	WG	0.0075-0.010	1000	0.100	4	35	
	Sweden	WG			0.100	6 (4)	42	podosphaera leucotricha
	Sweden	WG			0.100	6 (4)	42	venturia inaequalis
	Switzerland	WG			0.100	4		podosphaera leucotricha
	Switzerland	WG			0.100	4		venturia inaequalis
	UK	WG	0.050	200	0.100	5 (4)	35	venturia inaequalis
	Uruguay	SC	0.005	2000	0.100	3		venturia spp
Citrus	Japan	WG			1.410	3	14	botrytis cinerea
	Japan	WG			1.410	3	14	diaporthe citri
	Japan	WG			1.410	3	14	elsinoe fawcettii
	South Africa	WG	0.02	500			56	guidnardia citricarpa
Currant, black	Norway	WG	0.01-0.02			4	21	pseudopeziza ribis
	Norway	WG	0.01-0.02			4	21	sphaerotheca mors-uvae
	Switzerland	WG			0.15	4	21	glomerella cingulata
Currant, red	Norway	WG	0.01-0.02			4	21	pseudopeziza ribis

Commodity	Country	Form	Application			Max No[a]	PHI, days	Pest or disease, notes
			Spray conc., kg ai/hl	Water vol., l/ha	kg ai/ha			
	Norway	WG	0.01-0.02			4	21	sphaerotheca mors-uvae
	Switzerland	WG			0.15	4	21	glomeerella cingulata
Gooseberry	Norway	WG	0.01-0.02			4	21	pseudopeziza ribis
	Norway	WG	0.01-0.02			4	21	sphaerotheca mors-uvae
Grape	Austria	WG	0.0125	300-1000	0.0375-0.125	6 (3)	35	powdery mildew
	Austria	WG	0.0125	300-1000	0.0375-0.125	6 (3)	35	Uncinula necator
	Chile	SC			0.100	3	45	botrytis cinerea
	Chile	SC			0.100	3	45	uncinula necator
	Germany	WG	0.0075	*1600*	*0.12*	6 (3)	35	uncinula necator
	Hungary	WG	0.010	1000	0.100	5	35	uncinula necator
	Israel	WG	0.010	1000	0.100		21	uncinula necator
	Japan	WG			0.940	3	30	diaporthe spp.
	Japan	WG			0.940	3	30	gloeosporium ampelophagum
	Japan	WG			0.940	3	30	plasmopara viticola
	Slovakia	WG			0.02-0.03	3		botrytis cinerea
	Slovakia	WG			0.02-0.03	3		plasmopara viticola
	Slovakia	WG			0.02-0.03	3		uncinula necator
	South Africa	WG	0.023	250		6	14	uncinula necator
	Spain	WG	0.0075-0.015			3	35	uncinula necator
	Switzerland	WG	0.0075	*1600*	*0.12*	4	b	erwinia herbicola
	Switzerland	WG	0.0075	*1600*	*0.12*	4	b	guignardia bidwellii
	Switzerland	WG	0.0075	*1600*	*0.12*	4	b	plasmopara viticola
	Switzerland	WG	0.0075	*1600*	*0.12*	4	b	uncinula necator
Peach	Japan	WG			1.175	3	1	venturia carpophila
Pear	Austria	WG	0.010	1000	0.100	6 (4)	35	Venturia pirina
	Belgium	WG	0.007	1500	0.100	8 (4)		venturia pirina
	Chile	SC			0.100	3	45	podosphaera leucotricha
	Chile	SC			0.100	3	45	venturia inaequalis
	Chile	SC			0.100	3	45	venturia pirina
	France	WG	0.010	1000	0.100	6 (4)	35	venturia pirina
	Hungary	WG	0.010	1000	0.100	4	35	podosphaera leucotricha
	Hungary	WG	0.010	1000	0.100	4	35	venturia inaequalis
	Italy	WG	0.007	1000		8 (4)	14	stemphylium spp.
	Netherlands	WG	0.010	1000	0.100	8 (4)	42	venturia pirina
	Norway	WG	0.005-0.0075			4	21	phyllactinia guttata/pyri
	Norway	WG	0.005-0.0075			4	21	venturia pirina
	Poland	WG			0.100	6	35	podosphaera leucotricha
	Poland	WG			0.100	6	35	venturia pirina
	South Africa	WG	0.005	500		6	45	venturia pirina
	Spain	WG	0.0075-0.010	1000	0.100	4	35	venturia pirina
	Sweden	WG			0.100	6 (4)	42	phyllactinia guttata/pyri
	Sweden	WG			0.100	6 (4)	42	venturia pirina
	Switzerland	WG			0.100	4		podosphaera leucotricha
	Switzerland	WG			0.100	4		venturia inaequalis
	Uruguay	SC	0.005	2000	0.100	3		venturia spp
Pear, Oriental	Japan	WG			1.410	3	14	alternaria kikuchiana
	Japan	WG			0.470	3	14	venturia nashicola
Plum	Norway	WG				4	21	blumeriella jaapii
Plum, Kaki	Japan	WG			0.799	3	14	phyllactinia suffulta

Commodity	Country	Form	Application			Max No[a]	PHI, days	Pest or disease, notes
			Spray conc., kg ai/hl	Water vol., l/ha	kg ai/ha			
Pome fruits	Germany	WG	0.00625		~0.0625 per metre of tree top	8 (4)	35	podosphaera leucotricha Typically pome fruit trees 3m ~ 0.1875kg ai/ha
	Germany	WG	0.00625		~0.0625 per metre of tree top	8 (4)	35	venturia spp. Typically pome fruit trees 3m ~0.1875kg ai/ha
Small fruits	Switzerland	WG			0.150	4	21	powdery mildew
Strawberry	Israel	WG		1000	0.100		3	
	Norway	WG	0.01-0.02			4	14	diplocarpon earlianum
	Norway	WG	0.01-0.02			4	14	mycosphaerella fragariae
	Norway	WG	0.01-0.02			4	14	phomopsis obscurans
	Switzerland	WG			0.150	4	14	uncinula necator

[a] Numbers in parentheses represent the **proposed** maximum number of applications since GAP is to be changed (probably in 1999 season) for members of the European Community
[b] Use at 3-leaf stage – GS 13 – to berry touch – GS 77 to 79.
Figures in italics were not stated on the product label or in registration document but are estimated values supplied by the manufacturer.

Table 37. Registered uses of kresoxim-methyl on vegetables.

Commodity	Country	Form	F/G	Application			Max. No.	PHI, days	Pest or disease
				Spray conc., g ai/hl	Water, l/ha	kg ai l/ha			
Cucumber	Brazil	SC	F	0.030	500	0.150	3	7	erysiphe cichoracearum
	Japan	SC	F			0.415	3	1	sphaerotheca fuliginea
	Norway	WG	G	0.01-0.015			4	4	leveillula taurica
Cucurbits	Spain[a]	WG	G	0.01-0.015				3	-
Onion, Welsh	Japan	SC	F			0.623	3	7	puccinia allii
Onion	Nicaragua	SC	F			0.225			alternaria spp.
Pepper, Sweet	Spain[a]	WG	G	0.01-0.025				3	-
Potato	Brazil	SC	F	0.040	500	0.200	3	7	alternaria solani
Tomato	Brazil	SC	F	0.020	1000	0.200	3	3	alternaria solani
	Norway	WG	G	0.01-0.015			4	4	leveillula taurica
	Spain[a]	WG	G	0.01-0.025				3	-

F: field G: glasshouse
[a] Information quoted from the *Notification of Authorisation,* 24 July, 1998. Ministerio de Agricultura, Pesca y Alimentation, Spain. The product label detailed use only on pome fruit

Table 38. Registered uses of kresoxim-methyl on cereals (field applications).

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
Cereals	Germany	SE	0.031-0.063	200-400	0.125	1	35	cercosporella herpotrichoides
	Germany	SE	0.031-0.063	200-400	0.125	1	35	cercosporella herpotrichoides
	Japan	SC			0.415	3	14	erysiphe graminis
	Japan	SC			0.415	3	14	fusarium nivale
	Japan	SC			0.415	3	14	fusarium roseum
Barley	Belgium	SC	0.063	200	0.125	2	35	erysiphe graminis hordei
	Belgium	SC	0.063	200	0.125	2	35	puccinia hordei
	Belgium	SC	0.063	200	0.125	2	35	puccinia striiformis

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
	Belgium	SC	0.063	200	0.125	2	35	pyrenophora teres
	Belgium	SC	0.063	200	0.125	2	35	rhynchosporium secalis
	France	SE	0.053	200	0.0105	2	35	erysiphe graminia
	France	SC	0.063	200	0.125	2	35	cochliobolus sativus
	France	SC	0.063	200	0.125	2	35	erysiphe graminis avenae
	France	SC	0.063	200	0.125	2	35	puccinia hordei
	France	SC	0.063	200	0.125	2	35	puccinia striiformis
	France	SC	0.063	200	0.125	2	35	rhynchosporium secalis
	Germany	SE	0.027-0.053	200-400	0.105	2	35	erisyphe graminis/secalis
	Germany	SE	0.027-0.053	200-400	0.105	2	35	erysiphe graminis
	Germany	SE	0.027-0.053	200-400	0.105	2	35	erysiphe graminis/tritici
	Germany	SE	0.031-0.063	200-400	0.125	2	35	erysiphe graminis/tritici
	Germany	SE	0.031-0.063	200-400	0.125	2	35	puccinia hordei
	Germany	SE	0.031-0.063	200-400	0.125	2	35	pyrenophora teres
	Germany	SE	0.031-0.063	200-400	0.125	2	35	rhynchosporium secalis
	Germany	SC	0.031-0.063	200-400	0.125	2	35	erysiphe spp
	Germany	SC	0.031-0.063	200-400	0.125	2	35	puccinia hordei
	Germany	SC	0.031-0.063	200-400	0.125	2	35	pyrenophora teres
	Germany	SC	0.031-0.063	200-400	0.125	2	35	rhynchosporium secalis
	Luxembourg	SC	0.031-0.063	200-400	0.125	2	35	errysiphe graminishelminthosporium spp.puccinia hordeipuccinia striiformisrhynchosporium spp.
	Norway	SE			0.105		42	cercosporella herpotrichoides
	Norway	SE			0.105		42	leptosphaeria nodorum
	Norway	SE			0.105		42	mycosphaerella tassiana
	Switzerland	SC			0.126	1		erysiphe graminis/tritici
	Switzerland	SC			0.126	1		puccinia hordei
	Switzerland	SC			0.126	1		pyrenophora teres
	Switzerland	SC			0.126	1		septoria passerinii
Barley, Spring	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis hordei
	Belgium	SE	0.053	200	0.105	2	35	puccinia hordei
	Belgium	SE	0.053	200	0.105	2	35	pyrenophora teres
	Ireland	SC	0.063	200	0.125	2	-	cercosporella herpotrichoideserysiphe graminis hordeipuccinia hordeipuccinia striiformispyrenophora teresseptoria passerinii
	Netherlands	SE			0.105	2	35	erysiphe graminis
	Netherlands	SC			0.125	2	35	puccinia hordei
	Netherlands	SC			0.125	2	35	puccinia striiformis
	Netherlands	SC			0.125	2	35	pyrenophora teres
	Netherlands	SC			0.125	2	35	rhynchosporium secalis
	Poland	SE	0.053	200	0.105	1	35	erysiphe graminis
	Poland	SE	0.053	200	0.105	1	35	puccinia hordei
	Poland	SE	0.053	200	0.105	1	35	pyrenophora teres
	Poland	SE	0.053	200	0.105	1	35	rhynchosporium secalis
	Slovakia	SC			0.125	1		erysiphe graminis
	Slovakia	SC			0.125	1		pyrenophora teres
	Slovakia	SC			0.125	1		rhynchosporium secalis
	UK	SE			0.105	2		erysiphe graminis
	UK	SE			0.105	2		rhynchosporium secalis
	UK	SC	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SC	0.063	200	0.125	2		furarium spp
	UK	SC	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SC	0.063	200	0.125	2		septoria tritici
Barley, Winter	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis hordei
	Belgium	SE	0.053	200	0.105	2	35	puccinia hordei
	Belgium	SE	0.053	200	0.105	2	35	pyrenophora teres
	Belgium	SC	0.063	200	0.125	2	35	erysiphe graminis hordei
	Belgium	SC	0.063	200	0.125	2	35	puccinia hordei

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
	Belgium	SC	0.063	200	0.125	2	35	puccinia striiformis
	Belgium	SC	0.063	200	0.125	2	35	pyrenophora teres
	Belgium	SC	0.063	200	0.125	2	35	rhynchosporium secalis
	Ireland	SC	0.063	200	0.125	2	-	cercosporella herpotrichoideserysiphe graminis hordeipuccinia hordeipuccinia striiformispyrenophora teresseptoria passerinii
	Netherlands	SE			0.105	2	35	erysiphe graminis
	Netherlands	SE			0.105	2	35	erysiphe graminis
	Netherlands	SC			0.125	2	35	puccinia hordei
	Netherlands	SC			0.125	2	35	puccinia striiformis
	Netherlands	SC			0.125	2	35	pyrenophora teres
	Netherlands	SC			0.125	2	35	rhynchosporium secalis
	Poland	SE	0.053	200	0.105	1		erysiphe graminis
	Poland	SE	0.053	200	0.105	1		puccinia hordei
	Poland	SE	0.053	200	0.105	1		pyrenophora teres
	Poland	SE	0.053	200	0.105	1		rhynchosporium secalis
	UK	SE			0.105	2		erysiphe graminis
	UK	SE			0.105	2		rhynchosporium secalis
	UK	SE	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SE	0.063	200	0.125	2		fusarium spp
	UK	SE	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SE	0.063	200	0.125	2		septoria tritici
	UK	SC	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SC	0.063	200	0.125	2		fusarium spp.
	UK	SC	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SC	0.063	200	0.125	2		septoria tritici
	UK	SE	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SE	0.063	200	0.125	2		fusarium spp.
	UK	SE	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SE	0.063	200	0.125			septoria tritici
Oats	France	SC	0.063	200	0.125	2	35	erysiphe graminis avenae
	France	SC	0.063	200	0.125	2	35	puccinia avenae
	Norway	SE			0.105		42	cercosporella herpotrichoides
	Norway	SE			0.105		42	leptosphaeria nodorum
	Norway	SE			0.105		42	mycosphaerella tassiana
Rye	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis/tritici
	Belgium	SE	0.053	200	0.105	2	35	leptosphaeria nodorum
	Belgium	SE	0.053	200	0.105	2	35	puccinia recondita
	Belgium	SE	0.053	200	0.105	2	35	puccinia striiformis
	Belgium	SE	0.053	200	0.105	2	35	septoria tritici
	Belgium	SC	0.063	200	0.125	1	35	erysiphe graminis/tritici
	Belgium	SC	0.063	200	0.125	1	35	puccinia recondita
	Belgium	SC	0.063	200	0.125	1	35	puccinia striiformis
	Belgium	SC	0.063	200	0.125	1	35	septoria tritici
	France	SC	0.063	200	0.125	2	35	puccinia recondita/recondita
	France	SC	0.063	200	0.125	2	35	rhynchosporium secalis
	Germany	SE	0.027-0.063	200-400	0.105	2	35	erisyphe graminis/secalis
	Germany	SE	0.027-0.063	200-400	0.105	2	35	erysiphe graminis
	Germany	SE	0.027-0.063	200-400	0.105	2	35	erysiphe graminis/tritici
	Germany	SE	0.027-0.063	200-400	0.125	2	35	erysiphe graminis/tritici
	Germany	SE	0.027-0.063	200-400	0.125	2	35	puccinia recondita/recondita
	Germany	SE	0.027-0.063	200-400	0.125	2	35	rhynchosporium secalis
	Germany	SC	0.027-0.063	200-400	0.125	2	35	erysiphe spp
	Germany	SC	0.027-0.063	200-400	0.125	2	35	puccinia recondita/recondita
	Germany	SC	0.027-0.063	200-400	0.125	2	35	rhynchosporium secalis
	Luxembourg	SC	0.027-0.063	200-400	0.125	1	35	puccinia recondita/triticiapuccinia striiformisseptoria spp.
	Poland	SE	0.053	200	0.105	1	35	erysiphe graminis
	Poland	SE	0.053	200	0.105	1	35	puccinia recondita
	Poland	SE	0.053	200	0.105	1	35	rhynchosporium secalis
	Poland	SE	0.053	200	0.105	1	35	septoria tritici

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
	Switzerland	SC			0.126	1		puccinia recondita/recondita
Rye, Winter	Netherlands	SC			0.125	2	35	puccinia recondita/recondita
	Netherlands	SC			0.125	2	35	rhynchosporium secalis
Spelt	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis/tritici
	Belgium	SE	0.053	200	0.105	2	35	leptosphaeria nodorum
	Belgium	SE	0.053	200	0.105	2	35	puccinia recondita
	Belgium	SE	0.053	200	0.105	2	35	puccinia striiformis
	Belgium	SE	0.053	200	0.105	2	35	septoria tritici
	Belgium	SC	0.063	200	0.125	2	35	erysiphe graminis
	Belgium	SC	0.063	200	0.125	2	35	puccinia recondita
	Belgium	SC	0.063	200	0.125	2	35	puccinia striiformis
	Belgium	SC	0.063	200	0.125	2	35	septoria tritici
	Luxembourg	SC		200-400	0.125	2	35	puccinia reconditapuccinia striiformis
Triticale	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis/tritici
	Belgium	SE	0.053	200	0.105	2	35	leptosphaeria nodorum
	Belgium	SE	0.053	200	0.105	2	35	puccinia recondita
	Belgium	SE	0.053	200	0.105	2	35	puccinia striiformis
	Belgium	SE	0.053	200	0.105	2	35	septoria tritici
	Belgium	SC	0.063	200	0.125	1	35	erysiphe graminis/tritici
	Belgium	SC	0.063	200	0.125	1	35	puccinia recondita
	Belgium	SC	0.063	200	0.125	1	35	puccinia striiformis
	Belgium	SC	0.063	200	0.125	1	35	septoria tritici
	France	SC	0.063	200	0.150	2	35	cercosporella herpotrichoides
	France	SC	0.063	200	0.125	2	35	puccinia recondita
	France	SC	0.063	200	0.125	2	35	septoria tritici
	Germany	SE	0.031-0.063	200-400	0.125	1	35	leptosphaeria nodorum
	Germany	SC	0.031-0.063	200-400	0.125	1	35	leptosphaeria nodorum
	Luxembourg	SC	0.031-0.063	200-400	0.125	1	35	puccinia recondita/triticiapuccinia striiformisseptoria spp.
Wheat, Spring	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis/tritici
	Belgium	SE	0.053	200	0.105	2	35	leptosphaeria nodorum
	Belgium	SE	0.053	200	0.105	2	35	septoria tritici
	Ireland	SC	0.063	200	0.125	2	3/7	capnodium salicimiumcercosporella herpotrichoideserysiphe graminis/tritici
	Netherlands	SE			0.105	2	35	erysiphe graminis
	Netherlands	SC			0.125	2	35	erysiphe graminis/tritici
	Netherlands	SC			0.125	2	35	leptosphaeria nodorum
	Netherlands	SC			0.125	2	35	puccinia recondita/tritici
	Netherlands	SC			0.125	2	35	puccinia striiformis
	Netherlands	SC			0.125	2	35	septoria tritici
	Poland	SE	0.053	200	0.105	1	35	erysiphe graminis
	Poland	SE	0.053	200	0.105	1	35	leptosphaeria nodorum
	Poland	SE	0.053	200	0.105	1	35	puccinia graminis spp.
	Poland	SE	0.053	200	0.105	1	35	puccinia graminis/tritici
	Poland	SE	0.053	200	0.105	1	35	puccinia recondita
	Poland	SE	0.053	200	0.105	1	35	septoria tritici
Wheat, Soft	Belgium	SC	0.063	200	0.125	2	35	erysiphe graminis/tritici
	Belgium	SC	0.063	200	0.125	2	35	fusarium spp.
	Belgium	SC	0.063	200	0.125	2	35	leptosphaeria nodorum
	Belgium	SC	0.063	200	0.125	2	35	puccinia recondita
	Belgium	SC	0.063	200	0.125	2	35	puccinia striiformis
	Belgium	SC	0.063	200	0.125	2	35	septoria tritici
	France	SE	0.053	200	0.105	2	35	erysiphe graminis
	France	SC	0.075	200	0.150	2	35	cercosporella herpotrichoides
	France	SC	0.063	200	0.125	2	35	erysiphe graminis avenae
	France	SC	0.063	200	0.125	2	35	fusarium culmorum
	France	SC	0.063	200	0.125	2	35	puccinia recondita/tritici
	France	SC	0.063	200	0.125	2	35	puccinia striiformis
	France	SC	0.063	200	0.125	2	35	septoria tritici
	Germany	SE	0.027-0.053	200	0.105	2	35	erisyphe graminis/secalis

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
	Germany	SE	0.027-0.053	200	0.105	2	35	erysiphe graminis
	Germany	SE	0.027-0.053	200	0.105	2	35	erysiphe graminis/tritici
	Germany	SE	0.031-0.063	200-400	0.125	1	35	cercosporella herpotrichoides
	Germany	SE	0.031-0.063	200-400	0.125	2	35	erysiphe graminis/tritici
	Germany	SE	0.031-0.063	200-400	0.125	2	35	leptosphaeria nodorum
	Germany	SE	0.031-0.063	200-400	0.125	2	35	puccinia recondita/tritici
	Germany	SE	0.031-0.063	200-400	0.125	2	35	puccinia striiformis
	Germany	SE	0.031-0.063	200-400	0.125	2	35	pyrenophora triciti-repentis
	Germany	SE	0.031-0.063	200-400	0.125	2	35	septoria tritici
	Germany	SC	0.031-0.063	200-400	0.125	1	35	cercosporella herpotrichoides
	Germany	SC	0.031-0.063	200-400	0.125	2	35	erysiphe graminis/tritici
	Germany	SC	0.031-0.063	200-400	0.125	2	35	helminthosporium spp
	Germany	SC	0.031-0.063	200-400	0.125	2	35	leptosphaeria nodorum
	Germany	SC	0.031-0.063	200-400	0.125	2	35	puccinia recondita/tritici
	Germany	SC	0.031-0.063	200-400	0.125	2	35	puccinia striiformis
	Germany	SC	0.031-0.063	200-400	0.125	2	35	septoria tritici
	Luxembourg	SC	0.031-0.063	200-400	0.125	2	35	erysiphe graminisfusarium oxysporumpuccinia recondita/triticiapuccinia striiformisseptoria spp.
	Norway	SE			0.105		42	cercosporella herpotrichoides
	Norway	SE			0.105		42	leptosphaeria nodorum
	Norway	SE			0.105		42	mycosphaerella tassiana
	Switzerland	SC			0.126	1		erysiphe graminis/tritici
	Switzerland	SC			0.126	1		leptosphaeria nodorum
	Switzerland	SC			0.126	1		puccinia recondita/tritici
	Switzerland	SC			0.126	1		puccinia striiformis
	Switzerland	SC			0.126	1		septoria tritici
Wheat, Winter	Belgium	SE	0.053	200	0.105	2	35	erysiphe graminis/tritici
	Belgium	SE	0.053	200	0.105	2	35	leptosphaeria nodorum
	Belgium	SE	0.053	200	0.105	2	35	septoria tritici
	Belgium	SC	0.075	200	0.150	1	35	cercosporella herpotrichoides
	Ireland	SC	0.063	200	0.125	2	-	capnodium salicimiumcercosporella herpotrichoideserysiphe graminis/triticileptosphaeria nodurumpuccinia recondita/triticipuccinia striiformisseptori tritici
	Luxembourg	SC		200-400	0.150	1	35	cercosporella herpotrichoides
	Netherlands	SE			0.105	2	35	erysiphe graminis
	Netherlands	SC			0.125	2	35	erysiphe graminis/tritici
	Netherlands	SC			0.125	2	35	leptosphaeria nodorum
	Netherlands	SC			0.125	2	35	puccinia recondita/tritici
	Netherlands	SC			0.125	2	35	puccinia striiformis
	Netherlands	SC			0.125	2	35	septoria tritici
	Poland	SE	0.053	200	0.105	1	35	erysiphe graminis
	Poland	SE	0.053	200	0.105	1	35	leptosphaeria nodorum
	Poland	SE	0.053	200	0.105	1	35	puccinia graminis spp.
	Poland	SE	0.053	200	0.105	1	35	puccinia graminis/tritici
	Poland	SE	0.053	200	0.105	1	35	puccinia recondita
	Poland	SE	0.053	200	0.105	1	35	septoria tritici
	Slovakia	SC			0.125	1		erysiphe graminis
	Slovakia	SC			0.125	1		leptosphaeria nodorum
	Slovakia	SC			0.125	1		puccinia spp.
	UK	SE			0.105	2		erysiphe graminis
	UK	SE			0.105	2		septoria tritici
	UK	SE	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SE	0.063	200	0.125	2		fusarium spp.
	UK	SE	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SE	0.063	200	0.125	2		septoria tritici
	UK	SC	0.063	200	0.125	2		cercosporella herpotrichoides
	UK	SC	0.063	200	0.125	2		fusarium spp.

Commodity	Country	Form	Application			Max No.	PHI days	Pest or disease
			Spray conc., kg ai/hl	Water, l/ha	kg ai/ha			
	UK	SC	0.063	200	0.125	2		leptosphaeria nodorum
	UK	SC	0.063	200	0.125	2		septoria tritici

Table 39. Registered uses of kresoxim-methyl on ornamentals.

Commodity	Country	Form	F/G	Application			Max No	PHI, days	Pest or disease
				Spray conc., kg ai/hl	Water vol., l/ha	kg ai/ha			
Carnation	Colombia	SC	G	0.011	2000	0.220	10		botrytis cinerea
	Kenya	WG	F		1000	0.250	8	500	heterosporium spp.
	Kenya	WG	F		1000	0.250	-8	500	uromyces dianthi
	Switzerland	WG	F			0.100	4		uromyces dianthi
Cherry, Sweet	Norway	WG	F			0.005-0.01	4	21	blumeriella jaapii
Chrysanthemum	Colombia	SC	G		2000	0.220	10		botrytis cinerea
	Netherlands	SC	F	0.100					puccinia horiana
	Switzerland	WG	F			0.100	4		puccinia chrysanthemi
Deciduous trees, horticulture	Netherlands	SC	F						microsphaera alni/quercina
	Netherlands	SC	F						sphaerotheca pannosa
Gladiolus	Netherlands	SC	F			0.200	8		botrytis elliptica
	Netherlands	SC	F			0.200	8		botrytis gladiolorum
Larkspur, Rocket	Netherlands	SC	F						erysiphe spp.
	Netherlands	SC	F						sphaerotheca fuliginea
Lily, Orange	Netherlands	SC	F			0.200	8		botrytis elliptica
	Netherlands	SC	F			0.200	8		botrytis gladiolorum
Med. aromatic herbs spices, flavour	Netherlands	SC	F						erysiphe spp.
	Netherlands	SC	F						sphaerotheca fuliginea
Oak	Netherlands	SC	F	0.100					microsphaera alni/quercina
	Netherlands	SC	F	0.100					sphaerotheca pannosa
Ornamentals	Ecuador	WG	F			0.150			
Phlox, Annual	Netherlands	SC	F	0.100					erysiphe spp.
	Netherlands	SC	F	0.100					sphaerotheca fuliginea
Prunus-Ornamental Spp	Norway	WG	F	0.01-0.015			4		diplocarpon rosae
	Norway	WG	F	0.01-0.015			4		erysiphe cichoracearum
	Norway	WG	F	0.01-0.015			4		phragmidium mucronatum
Rose	Colombia	SC	G		2000	0.22	10		botrytis cinerea
	Colombia	SC	G		2000	0.22	10		sphaerotheca pannosa
	Ecuador	WG	F			0.105			
	Kenya	WG	F		1000	0.250	8	500	diplicarpon rosae
	Kenya	WG	F		1000	0.250	8	500	sphaerotheca pannosa
	Switzerland	WG	F			0.150			diplocarpon rosae
	Switzerland	WG	F			0.150			sphaerotheca pannosa
Sweet William	Switzerland	WG	F			0.150	4	21	uromyces dianthi
Tulip	Netherlands	SC	F			0.200	8		botrytis tulipae

RESIDUES RESULTING FROM SUPERVISED TRIALS

Trials were carried out under field conditions unless otherwise stated. They were reported in sufficient detail and acceptable analytical information was supplied. The residues were of parent kresoxim-methyl unless otherwise stated in the Tables or text. In some of the cereal trials “total” residues were determined. These were the sum of kresoxim-methyl and the metabolites 490M2 and 490M9 expressed as kresoxim-methyl. In selecting residues for the estimation of maximum residue levels and STMRs the trials according to maximum GAP (i.e. minimum PHI, maximum dose rate and

maximum number of treatments) have been used and the results from them underlined.

The residue trials were on apples, pears, grapes, bulb onions, cucumbers, melons, tomatoes, sweet peppers, wheat, barley, rye and pecans. The results are shown in Tables 40-53 CLICK HERE to continue

Table 40. Supervised residue trials on apples.

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
Nyíregyháza, Hungary	09/08/94	0.400	-	-	14	-	RAC	0.05	0	# 94/11727
							RAC	0.13	0	
							RAC	0.09	3	
							RAC	0.08	3	
							RAC	0.06	7	
							RAC	0.08	7	
							RAC	0.06	10	
							RAC	0.04	10	
							RAC	0.06	14	
							RAC	0.04	14	
							RAC	0.03	21	
							RAC	0.06	21	
							RAC	0.02	28	
							RAC	0.03	28	
							RAC	<0.01	35	
							RAC	0.01	35	
							RAC	<0.01	35	
Gualdo (FE), Italy	08/09/93	0.100	1500	0.007	12	ripening	RAC	0.05	0	# 94/11751
							RAC	<0.05	7	
							RAC	<0.05	14	
							RAC	<0.05	21	
							RAC	<0.05	28	
Verona, Italy	13/09/93	0.100	1200	0.008	12	ripening	RAC	<0.05	0	# 94/11751
							RAC	0.05	7	
							RAC	<0.05	14	
							RAC	<0.05	21	
							RAC	<0.05	28	
Voghenza, Italy	11/08/94	0.100	24	0.417	8	7 cm	RAC	0.14	0	# 95/10054
							RAC	<0.05	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	41	
Belfiore, Italy	30/08/94	0.100	24	0.417	8	6 cm	RAC	0.08	0	# 95/10054
							RAC	<0.05	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	42	
Don Benito (1), Spain	03/08/93	0.100	450	0.022	8	81	RAC	0.08	0	# 95/10082
							RAC	0.06	7	
							RAC	<0.05	14	
							RAC	<0.05	21	
							RAC	<0.05	28	
Don Benito (2), Spain	03/08/93	0.100	450	0.022	8	81	RAC	0.12	0	# 95/10082
							RAC	0.10	7	
							RAC	0.05	14	
							RAC	<0.05	21	
							RAC	<0.05	28	
Merville, France	27/08/93	0.100	450	0.022	8	79	RAC	0.20	0	# 95/10082
							RAC	0.19	7	
							RAC	0.06	14	
							RAC	0.07	21	
							RAC	<0.05	28	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
Sayrac, France	27/09/93	0.100	450	0.022	8	79	RAC	0.16	0	# 95/10082
							RAC	0.18	7	
							RAC	0.14	14	
							RAC	<0.05	21	
							RAC	<0.05	28	
Merville, France	01/08/94	0.101	450	0.022	8	77	RAC	0.22	0	# 95/10418
							RAC	0.09	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	42	
Sayrac, France	01/08/94	0.111	490	0.023	8	77	RAC	0.19	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	42	
Postfeld-Bormsdorf 9, Germany	01/10/93	0.100	450	0.022	8	81	RAC	0.12	0	# 95/10082
							RAC	0.08	6	
							RAC	<0.05	14	
							RAC	<0.05	21	
							RAC	<0.05	27	
Gundheim, Germany	31/08/93	0.100	450	0.022	8	81	RAC	0.26	0	# 95/10082
							RAC	0.21	7	
							RAC	0.16	14	
							washed apple	0.19	14	
							apple juice	<0.05	14	
							wet pomace	<0.05	14	
							apple sauce	<0.05	14	
							apple sauce	<0.05	14	
							RAC	0.08	21	
							RAC	<0.05	28	
Stetten, Germany	17/09/93	0.100	450	0.022	8	81	RAC	0.16	0	# 95/10082
							RAC	0.11	7	# 95/10082
							RAC	0.19	14	# 95/10082
							washed apple	0.07	14	# 95/10082
							apple juice	<0.05	14	# 95/10082
							wet pomace	0.09	14	# 95/10082
							apple sauce	<0.05	14	# 95/10082
							apple sauce	<0.05	14	# 95/10082
							RAC	<0.05	21	# 95/10082
							RAC	<0.05	28	# 95/10082
Rödersheim-Gronau, Germany	14/09/93	0.100	450	0.022	8	83	RAC	0.16	0	# 95/10082
							RAC	0.17	7	
							RAC	0.08	14	
							washed apple	0.16	14	
							apple juice	<0.05	14	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
							wet pomace	0.17	14	
							apple sauce	<0.05	14	
							apple sauce	<0.05	14	
							RAC	0.09	21	
							RAC	<0.05	28	
Postfeld-Bormsdorf 9, Germany	02/08/94	0.100	447	0.022	8	77	RAC	0.09	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	42	
Stetten, Germany	27/07/94	0.102	447	0.023	8	77	RAC	<0.05	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	29	
							RAC	<0.05	35	
							RAC	<0.05	42	
Rödersheim-Gronau, Germany	31/08/94	0.102	455	0.022	8	85	RAC	0.12	0	# 95/10418
							RAC	0.07	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	42	
Sint-Truiden, Belgium	02/09/93	0.100	450	0.022	8	84	RAC	0.34	0	# 95/10082
							RAC	0.16	7	
							RAC	0.15	14	
							RAC	0.11	21	
							RAC	0.05	28	
Sint-Truiden, Belgium	10/08/94	0.101	450	0.022	8	81	RAC	0.10	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	29	
							RAC	<0.05	35	
							RAC	<0.05	43	
Wyler-Groesbeek, Netherlands	02/09/93	0.100	450	0.022	8	84	RAC	0.36	0	# 95/10082
							RAC	0.27	7	
							RAC	0.07	14	
							RAC	0.11	21	
							RAC	0.11	28	
Wyler-Groesbeek, Netherlands	19/08/94	0.118	523	0.023	8	85	RAC	0.20	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	28	
							RAC	<0.05	35	
							RAC	<0.05	44	
East Malling, Kent, UK	19/08/94	0.104	469	0.022	8	80	RAC	0.41	0	# 95/10418
							RAC	0.11	20	
							RAC	0.14	27	
							RAC	0.06	34	
							RAC	0.06	41	
Toddington, UK	09/08/94	0.106	466	0.023	8	79	RAC	0.99	0	# 95/10418

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
							RAC	0.23	22	
							RAC	0.18	28	
							RAC	<0.05	36	
							RAC	0.11	42	
Storridge, UK	09/08/94	0.101	455	0.022	8	79	RAC	0.41	0	# 95/10418
							RAC	0.22	22	
							RAC	0.09	28	
							RAC	<0.05	36	
							RAC	0.05	42	
Otham, Kent, UK	21/07/94	0.099	443	0.022	8	80	RAC	0.25	0	# 95/10418
							RAC	<0.05	21	
							RAC	0.05	29	
							RAC	<0.05	36	
							RAC	<0.05	42	
Brenchley, Kent, UK	21/07/94	0.103	459	0.022	8	80	RAC	0.24	0	# 95/10418
							RAC	<0.05	21	
							RAC	<0.05	29	
							RAC	<0.05	36	
							RAC	<0.05	42	
Willingham, UK	20/07/94	0.101	449	0.022	8	80	RAC	0.43	0	# 95/10418
							RAC	0.15	20	
							RAC	0.06	28	
							RAC	0.05	34	
							RAC	<0.05	42	
Christchurch, New Zealand	18/10/93	0.100	2000	0.005	4	Late Blossom	RAC	<0.01	130	# 95/11022
							RAC	<0.01	137	
							RAC	<0.01	144	
Christchurch, New Zealand	30/11/93	0.100	2000	0.005	4	3rd Cover	RAC	<0.01	87	# 95/11022
							RAC	<0.01	94	
							RAC	<0.01	101	
Christchurch, New Zealand	04/02/94	0.100	2000	0.005	4	7th Cover	RAC	0.01	21	# 95/11022
							RAC	<0.01	28	# 95/11022
							RAC	<0.01	35	
Christchurch, New Zealand	04/02/94	0.100	2000	0.005	12	7th Cover	RAC	0.03	21	# 95/11022
							RAC	<0.01	28	
							RAC	<0.01	35	
Hastings, New Zealand	03/11/93	0.075	2000	0.004	3	*	RAC	<0.01	101	# 95/11022
							RAC	<0.01	108	
							RAC	<0.01	118	
							RAC	<0.01	132	
Hastings, New Zealand	13/12/93	0.075	2000	0.004	3		RAC	<0.01	46	# 95/11022
							RAC	<0.01	53	
							RAC	<0.01	63	
							RAC	<0.01	77	
Hastings, New Zealand	14/01/94	0.075	2000	0.004	2		RAC	0.04	14	# 95/11022
							RAC	0.04	21	
							RAC	<0.01	31	
							RAC	<0.01	45	
Hastings, New Zealand	02/03/93	0.100	1500	0.007	11		RAC	0.01	22	# 95/11022
							RAC	<0.01	29	
Hastings, New	02/03/93	0.200	1500	0.013	11		RAC	0.21	1	# 95/11022

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
Zealand										
							RAC	0.05	8	
							RAC	0.04	22	
							RAC	<0.01	29	
Lyndhurst, Rd Hastings, New Zealand	17/12/92	0.038	1000	0.004	9		RAC	0.07	1	#95/11022
							RAC	0.06	3	
							RAC	0.01	7	
							RAC	<0.01	16	
							RAC	<0.01	24	
							RAC	<0.01	33	
Lyndhurst, Rd Hastings, New Zealand	17/12/92	0.038	1000	0.004	5		RAC	0.04	1	#95/11022
							RAC	0.04	3	
							RAC	0.01	7	
							RAC	<0.01	16	
							RAC	<0.01	24	
							RAC	<0.01	33	
Christchurch, New Zealand	08/02/93	0.075	1500	0.005	12	6th Cover	RAC	0.60	1	#95/11022
							RAC	0.27	3	
							RAC	0.23	7	
							RAC	0.04	14	
							RAC	0.06	21	
							RAC	0.05	28	
							RAC	<0.01	35	
Christchurch, New Zealand	08/02/93	0.150	1500	0.010	12	6th Cover	RAC	1.26	1	#95/11022
							RAC	0.45	3	
							RAC	0.49	7	
							RAC	0.28	14	
							RAC	0.47	21	
							RAC	0.10	28	
							RAC	0.19	35	
Villiersdorp, South Africa	29/01/95	0.125	2500	0.005	12		RAC	0.27	0	# 95/10948
							RAC	0.12	12	
							RAC	0.13	24	
							RAC	0.09	35	
							RAC	<0.05	42	
Villiersdorp, South Africa	29/01/95	0.250	2500	0.01	12		RAC	0.63	0	# 95/10948
							RAC	0.40	12	
							RAC	0.18	24	
							RAC	0.18	35	
							RAC	0.09	42	
Vyeboom, South Africa	05/01/95	0.125	2500	0.005	10		RAC	0.15	0	# 95/10949
							RAC	0.13	12	
							RAC	<0.05	24	
							RAC	<0.05	35	
							RAC	<0.05	42	
Vyeboom, South Africa	05/01/95	0.250	2500	0.01	10		RAC	0.38	0	# 95/10949
							RAC	0.19	12	
							RAC	0.11	24	
							RAC	0.14	35	
							RAC	0.06	42	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
Tiefkasfontein, Villiersdorp, South Africa	05/01/95	0.125	2500	0.005	10		RAC	0.21	0	#96/10831
							RAC	0.09	12	
							RAC	0.04	24	
							RAC	0.02	35	
Tiefkasfontein, Villiersdorp, South Africa	05/01/95	0.250	2500	0.010	10		RAC	0.48	0	#96/10831
							RAC	0.31	12	
							RAC	0.13	24	
							RAC	0.11	35	
Ashtabula County/OH, USA	16/05/95	1.120	1100	0.1	4		RAC	<0.05	90	#96/5118
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
							apple juice	<0.05	90	
							apple juice	<0.05	90	490M2
							apple juice	<0.05	90	490M9
							wet pomace	<0.05	90	
							wet pomace	<0.05	90	490M2
							wet pomace	<0.05	90	490M9
Tulare/CA, USA	28/03/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Tulare/CA, USA	19/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Tulare/CA, USA	28/03/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Tulare/CA, USA	19/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Mesa/CO, USA	07/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Mesa/CO, USA	28/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Delta/CO, USA	13/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Delta/CO, USA	04/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Stokes/NC, USA	12/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Stokes/NC, USA	03/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Alexander/NC, USA	13/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
							RAC	<0.05	90	
Alexander/NC, USA	03/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Carroll/VA, USA	13/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Carroll/VA, USA	03/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Ottawa/MI, USA	19/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Ottawa/MI, USA	09/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Kent/MI, USA	19/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Kent/MI, USA	09/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Ottawa/MI, USA	19/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Ottawa/MI, USA	09/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
								<0.05	90	
								<0.05	90	
Dunn/WI, USA	26/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Dunn/WI, USA	17/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Payette/ID, USA	22/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Payette/ID, USA	12/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Hood River/OR, USA	02/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Hood River/OR, USA	22/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Hood River/OR, USA	02/05/95	0.224	500	0.045	4		RAC	0.06	35	#96/5123
							RAC	<0.05	35	
							RAC	0.06	35	
Hood River/OR, USA	22/05/95	0.224	500	0.045	4		RAC	<0.05	35	#96/5123
							RAC	<0.05	35	
							RAC	<0.05	35	
Hood River/OR, USA	02/05/95	0.224	500	0.045	4		RAC	<0.05	75	#96/5123

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
							RAC	<0.05	75	
							RAC	<0.05	75	
Hood River/OR, USA	22/05/95	0.224	500	0.045	4		RAC	<0.05	75	#96/5123
							RAC	<0.05	75	
							RAC	<0.05	75	
Hood River/OR, USA	02/05/95	0.224	500	0.045	4		RAC	<0.05	147	#96/5123
							RAC	<0.05	147	
							RAC	<0.05	147	
Yakima/WA, USA	20/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Yakima/WA, USA	11/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Grant/WA, USA	26/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Grant/WA, USA	17/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Grant/WA, USA	18/04/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Grant/WA, USA	09/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Berks/PA, USA	03/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Berks/PA, USA	24/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Lehigh/PA, USA	01/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Lehigh/PA, USA	23/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	16/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	06/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	17/05/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	07/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	17/05/95	0.224	500	0.045	4		RAC	<0.05	35	#96/5123
							RAC	<0.05	35	
							RAC	<0.05	35	
Wayne/NY, USA	07/06/95	0.224	500	0.045	4		RAC	<0.05	35	#96/5123
							RAC	<0.05	35	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. and Remarks
							RAC	<0.05	35	
Wayne/NY, USA	17/05/95	0.224	500	0.045	4		RAC	<0.05	75	#96/5123
							RAC	<0.05	75	
							RAC	<0.05	75	
Wayne/NY, USA	07/06/95	0.224	500	0.045	4		RAC	<0.05	75	#96/5123
							RAC	<0.05	75	
							RAC	<0.05	75	
Wayne/NY, USA	17/05/95	0.224	500	0.045	4		RAC	<0.05	134	#96/5123
							RAC	<0.05	134	
							RAC	<0.05	134	
							RAC	<0.05	90	
							RAC	<0.05	90	
							RAC	<0.05	90	
Wayne/NY, USA	07/06/95	0.224	500	0.045	4		RAC	<0.05	90	#96/5123
							RAC	<0.05	90	
							RAC	<0.05	90	
British Columbia, Canada	22/05/95	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
Ontario, Canada	15/06/95	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
Nova Scotia, Canada	21/06/95	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
British Columbia, Canada	27/05/96	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
Ontario, Canada	19/06/96	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9
Nova Scotia, Canada	20/06/96	0.230	1000		4		RAC	<0.05	90	#97/5036
							RAC	<0.05	90	490M2
							RAC	<0.05	90	490M9

Table 41. Supervised residue trials on pears.

Location	Date of last tr.	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report-No.
Don Benito (3), Spain	13/07/93	0.099	463	0.021	8	81	0.13	0	# 95/10082
							<0.05	7	
							<0.05	14	
							<0.05	21	
							<0.05	28	
Sanlucar la mayor, Spain	12/07/94	0.098	440	0.022	8	78	0.11	0	# 95/10418
							<0.05	20	
							<0.05	29	
							<0.05	36	
							<0.05	42	
Gibraleon, Spain	12/07/94	0.107	470	0.023	8	77-78	0.05	0	# 95/10418
							<0.05	21	

Location	Date of last tr.	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report-No.
							<0.05	29	
							<0.05	36	
							<0.05	42	
Aznalcazar, Spain	10/08/94	0.101	458	0.022	8	78	0.11	0	# 95/10418
							<0.05	22	
							<0.05	28	
							<0.05	35	
							<0.05	42	
Tiekasfontein, Villiersdorp, South Africa	22/12/95	0.125	2500	0.005	8	2.0 in. diam.	0.25	0	#96/10835
							0.07	12	
							0.03	24	
							0.01	35	
							<0.01	42	
Tiekasfontein, Villiersdorp, South Africa	22/12/95	0.250	2500	0.010	8	2.0 in. diam.	0.42	0	#96/10835
							0.23	12	
							0.08	24	
							0.07	35	
							0.06*	42	

* According to South African GAP for apples

Table 42. Supervised residue trials on grapes.

Location	Applications Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
Ferdinando di Puglia, Italy	16/07/96	0.150	779	0.019	6	79	RAC	0.15	0	#97/10270
							RAC	<0.05	34	
							RAC	<0.05	41	
							RAC	<0.05	48	
							RAC	<0.05	55	
							RAC	0.06	0	490M2
							RAC	<0.05	34	490M2
							RAC	<0.05	41	490M2
							RAC	<0.05	48	490M2
							RAC	<0.05	55	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	34	490M9
							RAC	<0.05	41	490M9
							RAC	<0.05	48	490M9
							RAC	<0.05	55	490M9
S. Palomba, Italy	26/08/96	0.150	774	0.019	6	83	RAC	0.24	0	#97/10270
							RAC	0.15	36	
							RAC	0.13	42	
							RAC	0.06	49	
							RAC	0.10	56	
							RAC	0.08	0	490M2
							RAC	0.07	36	490M2
							RAC	0.10	42	490M2
							RAC	0.10	49	490M2
							RAC	0.09	56	490M2
							RAC	<0.05	0	490M9
							RAC	0.05	36	490M9
							RAC	0.06	42	490M9

Location	Applications						Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.				
							RAC	0.05	49	490M9
							RAC	0.06	56	490M9
S. Ferdinando di Puglia, Italy	14/07/95	0.150	767**	0.020	6	79	RAC	0.35	0	#97/10069 Table grape
							RAC	<0.05	35	
							RAC	<0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	0.07	0	490M2
							RAC	0.05	35	490M2
							RAC	0.05	42	490M2
							RAC	<0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
S. Ferdinando di Puglia, Italy	14/07/95	0.150	767**	0.020	6	79	RAC	0.28	0	Table variety 97/10069
							RAC	<0.05	35	
							RAC	<0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	<0.05	0	490M2
							RAC	<0.05	35	490M2
							RAC	<0.05	42	490M2
							RAC	<0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
S. Palomba, Pomezia, Italy	23/08/95	0.150	767**	0.020	6	35	RAC	0.12	0	Wine variety #97/10069
							RAC	<0.05	35	
							RAC	<0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	0.12	0	490M2
							RAC	0.13	35	490M2
							RAC	0.09	42	490M2
							RAC	0.08	49	490M2
							RAC	0.09	56	490M2
							RAC	0.08	0	490M9
							RAC	0.08	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
S. Palomba, Pomezia, Italy	23/08/95	0.150	767**	0.020	6	35	RAC	0.09	0	Wine variety 97/10069
							RAC	<0.05	35	
							RAC	<0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	0.09	0	490M2
							RAC	0.12	35	490M2
							RAC	0.12	42	490M2

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	0.11	49	490M2
							RAC	0.10	56	490M2
							RAC	0.05	0	490M9
							RAC	0.07	35	490M9
							RAC	0.07	42	490M9
							RAC	0.07	49	490M9
							RAC	0.06	56	490M9
S. Ferdinando di Puglia, Italy	14/07/95	0.150	767**	0.020	6	79	RAC	0.28	0	Table variety 97/10069
							RAC	<0.05	35	
							RAC	<0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	<0.05	0	490M2
							RAC	<0.05	35	490M2
							RAC	<0.05	42	490M2
							RAC	<0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
Jerez de la Frontera, Spain	14/07/95	0.149	562	0.027	6	81	RAC	0.81	0	#96/10830
							RAC	0.07	35	
							RAC	0.10	42	
							RAC	<0.05	49	
							RAC	<0.05	55	
							RAC	0.13	0	490M2
							RAC	0.27	35	490M2
							RAC	0.25	42	490M2
							RAC	0.21	49	490M2
							RAC	0.20	55	490M2
							RAC	<0.05	0	490M9
							RAC	0.09	35	490M9
							RAC	0.08	42	490M9
							RAC	0.07	49	490M9
							RAC	0.07	55	490M9
Jerez de la Frontera, Spain	14/07/95	0.150	565	0.027	6	81	RAC	0.88	0	#96/10830
							RAC	0.09	35	
							RAC	0.05	42	
							RAC	<0.05	49	
							RAC	<0.05	55	
							RAC	0.20	0	490M2
							RAC	0.22	35	490M2
							RAC	0.17	42	490M2
							RAC	0.16	49	490M2
							RAC	0.16	55	490M2
							RAC	0.06	0	490M9
							RAC	0.08	35	490M9
							RAC	0.06	42	490M9
							RAC	0.06	49	490M9
							RAC	0.07	55	490M9
Jerez de la Frontera, Spain	15/07/96	0.144	566	0.025	6	81/83	RAC	0.10	0	#96/10890
							RAC	<0.05	35	

Location	Applications						Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.				
							RAC	<0.05	43	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	0.06	0	490M2
							RAC	0.05	35	490M2
							RAC	0.05	43	490M2
							RAC	0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	43	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
Jerez de la Frontera, Spain	15/07/96	0.142	555	0.026	6	81/83	RAC	0.27	0	#96/10890
							RAC	<0.05	35	
							RAC	<0.05	43	
							RAC	<0.05	49	
							RAC	<0.05	56	
							RAC	0.09	0	490M2
							RAC	0.10	35	490M2
							RAC	0.08	43	490M2
							RAC	0.09	49	490M2
							RAC	0.07	56	490M2
							RAC	0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	43	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	56	490M9
Pernand-Vergelesses, France	10/08/95	0.152	508	0.030	6	79	RAC	0.85	0	#96/10830
							RAC	0.18	36	
							RAC	0.20	42	
							RAC	0.27	49	
							RAC	0.20	55	
							RAC	0.14	0	490M2
							RAC	0.07	36	490M2
							RAC	<0.05	42	490M2
							RAC	0.05	49	490M2
							RAC	<0.05	55	490M2
							RAC	0.09	0	490M9
							RAC	0.06	36	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	<0.05	55	490M9
Fronton, France	16/08/95	0.158	420	0.038	6	81	RAC	0.71	0	#96/10830
							RAC	0.36	34	
							RAC	0.39	41	
							RAC	0.26	49	
							RAC	0.14	56	
							RAC	0.14	0	490M2
							RAC	0.12	34	490M2
							RAC	0.14	41	490M2
							RAC	0.12	49	490M2
							RAC	0.11	56	490M2
							RAC	0.07	0	490M9
							RAC	0.06	34	490M9

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	0.07	41	490M9
							RAC	0.06	49	490M9
							RAC	0.06	56	490M9
Lisle sur Tarn, France	01/08/95	0.153	400	0.038	6	81	RAC	0.62	0	#96/10830
							RAC	0.21	34	
							RAC	0.28	42	
							RAC	0.22	49	
							RAC	0.21	55	
							RAC	0.19	0	490M2
							RAC	0.28	34	490M2
							RAC	0.30	42	490M2
							RAC	0.17	49	490M2
							RAC	0.23	55	490M2
							RAC	0.11	0	490M9
							RAC	0.17	34	490M9
							RAC	0.18	42	490M9
							RAC	0.10	49	490M9
							RAC	0.14	55	490M9
Pernand-Vergelesses, France	12/08/96	0.147	508	0.029	6	79	RAC	0.25	0	#96/10890
							RAC	0.06	35	
							RAC	<0.05	42	
							RAC	0.08	49	
							RAC	0.06	56	
							RAC	0.07	0	490M2
							RAC	0.06	35	490M2
							RAC	<0.05	42	490M2
							RAC	<0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	0.14	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	0.10	56	490M9
Fronton, France	09/08/96	0.153	586	0.026	6	81	RAC	0.95	0	#96/10890
							RAC	0.23	35	
							RAC	0.28	41	
							RAC	0.13	48	
							RAC	0.15	55	
							RAC	0.11	0	490M2
							RAC	0.06	35	490M2
							RAC	0.05	41	490M2
							RAC	<0.05	48	490M2
							RAC	<0.05	55	490M2
							RAC	0.10	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	41	490M9
							RAC	<0.05	48	490M9
							RAC	<0.05	55	490M9
Wiesloch, Germany	18/08/95	0.154	576	0.027	6	79	RAC	0.50	0	# 96/10698 white grape Müller-Thurgau
							RAC	0.11	0	490M2
							RAC	0.07	0	490M9
							RAC	0.25	34	
							RAC	0.15	34	490M2

Location	Applications						Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.				
							RAC	0.07	34	490M9
							must	<0.05	34	shortly after pressing
							must	0.05	34	490M2
							must	<0.05	34	490M9
							must	<0.05	34	after short heating
							must	<0.05	34	490M2
							must	<0.05	34	490M9
							wet pomace	0.57	34	
							wet pomace	0.42	34	490M2
							wet pomace	0.19	34	490M9
							wine	<0.05	34	
							wine	<0.05	34	490M2
							wine	<0.05	34	490M9
							wine	<0.05	34	after short heating
							wine	<0.05	34	490M2
							wine	<0.05	34	490M9
							RAC	0.35	42	
							RAC	0.16	42	490M2
							RAC	0.09	42	490M9
							RAC	0.19	49	
							RAC	0.15	49	490M2
							RAC	0.07	49	490M9
							RAC	0.16	56	
							RAC	0.15	56	490M2
							RAC	0.07	56	490M9
Wiesloch, Germany	12/09/95	0.155	580	0.027	6	83	RAC	0.64	0	# 96/10698 red grapes Spätburgunder
							RAC	0.10	0	490M2
							RAC	0.06	0	490M9
							RAC	0.73	35	
							RAC	0.08	35	490M2
							RAC	0.08	35	490M9
							must	0.06	35	after heating
							must	0.10	35	490M2
							must	0.06	35	490M9
							must	0.19	35	after cold pressing
							must	<0.05	35	490M2
							must	<0.05	35	490M9
							wet pomace	1.40	35	
							wet pomace	0.33	35	490M2
							wet pomace	0.18	35	490M9
							wine (rosé)	<0.05	35	
							wine (rosé)	0.05	35	490M2
							wine (rosé)	<0.05	35	490M9
							red wine	<0.05	35	after short heating
							red wine	0.11	35	490M2
							red wine	0.05	35	490M9

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	0.40	42	
							RAC	0.15	42	490M2
							RAC	0.10	42	490M9
							RAC	0.93	49	
							RAC	0.15	49	490M2
							RAC	0.10	49	490M9
							RAC	0.31	56	
							RAC	0.10	56	490M2
							RAC	0.07	56	490M9
Grünstadt-Sausenheim, Germany	16/08/95	0.155	582	0.027	6	79	RAC	0.63	0	# 96/10698 white grapes Müller-Thurgau
							RAC	0.11	0	490M2
							RAC	0.05	0	490M9
							RAC	0.44	35	
							RAC	0.11	35	490M2
							RAC	0.05	35	490M9
							must	0.08	35	directly after pressing
							must	<0.05	35	490M2
							must	<0.05	35	490M9
							must	0.07	35	after short heating
							must	<0.05	35	490M2
							must	<0.05	35	490M9
							wet pomace	0.38	35	
							wet pomace	0.21	35	490M2
							wet pomace	0.08	35	490M9
							wine	<0.05	35	
							wine	<0.05	35	490M2
							wine	<0.05	35	490M9
							wine	<0.05	35	after short heating
							wine	<0.05	35	490M2
							wine	<0.05	35	490M9
							RAC	0.16	41	
							RAC	0.07	41	490M2
							RAC	<0.05	41	490M9
							RAC	0.18	49	
							RAC	0.08	49	490M2
							RAC	<0.05	49	490M9
							RAC	0.33	56	
							RAC	0.09	56	490M2
							RAC	<0.05	56	490M9
Grünstadt-Sausenheim, Germany	16/08/95	0.153	580	0.026	6	79	RAC	0.39	0	# 96/10698 red grapes Portugieser
							RAC	0.07	0	490M2
							RAC	<0.05	0	490M9
							RAC	0.17	35	
							RAC	0.06	35	490M2
							RAC	<0.05	35	490M9
							must	<0.05	35	after heating
							must	0.07	35	490M2
							must	<0.05	35	490M9
							must	0.09	35	after cold pressing

Location	Applications						Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.				
							must	0.06	35	490M2
							must	<0.05	35	490M9
							wet pomace	0.52	35	
							wet pomace	0.11	35	490M2
							wet pomace	<0.05	35	490M9
							wine rosé	<0.05	35	
							wine rosé	<0.05	35	490M2
							wine rosé	<0.05	35	490M9
							red wine	<0.05	35	
							red wine	<0.05	35	490M2
							red wine	<0.05	35	490M9
							RAC	0.14	41	
							RAC	0.06	41	490M2
							RAC	<0.05	41	490M9
							RAC	0.20	49	
							RAC	0.05	49	490M2
							RAC	<0.05	49	490M9
							RAC	0.23	56	
							RAC	0.06	56	490M2
							RAC	<0.05	56	490M9
Wiesloch, Germany	26/08/96	0.147	573	0.026	6	79	RAC	0.73	0	#96/10890
							RAC	0.20	35	
							RAC	0.11	42	
							RAC	0.27	49	
							RAC	0.09	56	
							RAC	0.11	0	490M2
							RAC	0.06	35	490M2
							RAC	0.07	42	490M2
							RAC	0.06	49	490M2
							RAC	<0.05	56	490M2
							RAC	0.07	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	0.05	49	490M9
							RAC	<0.05	56	490M9
Wiesloch, Germany	26/08/96	0.148	582	0.025	6	79	RAC	0.63	0	#96/10890
							RAC	0.15	35	
							RAC	0.21	42	
							RAC	0.21	49	
							RAC	0.18	56	
							RAC	0.11	0	490M2
							RAC	0.05	35	490M2
							RAC	0.10	42	490M2
							RAC	0.07	49	490M2
							RAC	0.09	56	490M2
							RAC	0.08	0	490M9
							RAC	0.05	35	490M9
							RAC	0.06	42	490M9
							RAC	0.05	49	490M9
							RAC	0.07	56	490M9
Grünstadt, Germany	14/08/96	0.150	574	0.026	6	76	RAC	0.17	0	#96/10890

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	0.09	35	
							RAC	<0.05	42	
							RAC	0.06	49	
							RAC	0.10	56	
							RAC	<0.05	0	490M2
							RAC	<0.05	35	490M2
							RAC	<0.05	42	490M2
							RAC	<0.05	49	490M2
							RAC	<0.05	56	490M2
							RAC	<0.05	0	490M9
							RAC	<0.05	35	490M9
							RAC	<0.05	42	490M9
							RAC	<0.05	49	490M9
							RAC	0.06	56	490M9
Roodezandt, Wellington, South Africa	11/12/95	0.038	750*	0.005	6		RAC	0.12	0	#96/10832 Mean of duplicate analyses
							RAC	0.06	16	Mean of duplicate analyses
							RAC	<0.01	30	Mean of duplicate analyses
							RAC	0.01	46	Mean of duplicate analyses
Roodezandt, Wellington, South Africa	11/12/95	0.075	750*	0.010	6		RAC	0.26	0	#96/10832 Mean of duplicate analyses
							RAC	0.09	16	Mean of duplicate analyses
							RAC	0.07	30	Mean of duplicate analyses
							RAC	0.01	46	Mean of duplicate analyses
Roodezandt, Wellington, South Africa	11/12/95	0.150	750*	0.020	6		RAC	0.36	0	#96/10832 Mean of duplicate analyses
							RAC	0.09	16	Mean of duplicate analyses
							RAC	0.03	30	Mean of duplicate analyses
							RAC	0.06	46	Mean of duplicate analyses
Kanaan, Wellington, South Africa	10/01/96	0.113	1125	0.010	7		RAC	0.26	0	#96/10833 average water volume Mean of duplicate analyses
							RAC	0.22	7	Mean of duplicate analyses
							RAC	0.06	15	Mean of duplicate analyses

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	0.03	30	Mean of duplicate analyses
							RAC	0.04	37	Mean of duplicate analyses
							RAC	<0.01	44	Mean of duplicate analyses
Kanaan, Wellington, South Africa	10/01/96	0.225	1125*	0.020	7		RAC	0.65	0	#96/10833 Mean of duplicate analyses
							RAC	0.44	7	Mean of duplicate analyses
							RAC	0.27	15	Mean of duplicate analyses
							RAC	0.15	30	Mean of duplicate analyses
							RAC	0.12	37	Mean of duplicate analyses
							RAC	0.03	44	Mean of duplicate analyses
Kanaan, Wellington, South Africa	10/01/96	0.450	1125*	0.040	7		RAC	0.24	0	#96/10833 Mean of duplicate analyses
							RAC	0.20	7	Mean of duplicate analyses
							RAC	0.10	15	Mean of duplicate analyses
							RAC	0.09	30	Mean of duplicate analyses
							RAC	0.06	37	Mean of duplicate analyses
							RAC	0.13	44	Mean of duplicate analyses Mean of duplicate analyses
Uitkyk, Paarl, South Africa	27/12/95	0.114	1140*	0.010	7		RAC	0.27	0	#96/10834 Mean of duplicate analyses
							RAC	0.24	7	Mean of duplicate analyses
							RAC	0.20	15	Mean of duplicate analyses
							RAC	0.06	30	Mean of duplicate analyses
							RAC	0.07	45	Mean of duplicate analyses
Uitkyk, Paarl, South Africa	27/12/95	0.228	1140*	0.020	7		RAC	0.70	0	#96/10834 Mean of

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
										duplicate analyses
							RAC	0.49	7	Mean of duplicate analyses
							RAC	0.14	15	Mean of duplicate analyses
							RAC	0.21	30	Mean of duplicate analyses
							RAC	0.20	45	Mean of duplicate analyses
Uitkyk, Paarl, South Africa	27/12/95	0.456	1140*	0.040	7		RAC	1.55	0	#96/10834 Mean of duplicate analyses
							RAC	1.20	7	Mean of duplicate analyses
							RAC	0.62	15	Mean of duplicate analyses
							RAC	0.60	30	Mean of duplicate analyses
							RAC	0.64	45	Mean of duplicate analyses
Fresno County CA, USA	25/08/95	0.224			4		RAC	<0.05	30	#96/5137
							RAC	0.07	30	490M2
							RAC	<0.05	30	490M9
Tulare County CA, USA	01/09/94	0.224			4		RAC	<0.05	30	#96/5137
							RAC	<0.05	30	490M2
							RAC	<0.05	30	490M9
Kern County CA, USA	01/09/94	0.224			4		RAC	<0.05	30	#96/5137
							RAC	<0.05	30	490M2
							RAC	<0.05	30	490M9
Monterey County CA, USA	10/09/94	0.224			4		RAC	<0.05	30	#96/5137
							RAC	<0.05	30	490M2
							RAC	<0.05	30	490M9
Grant County WA, USA	13/09/94	0.224			4		RAC	0.18	30	#96/5137
							RAC	<0.05	30	490M2
							RAC	<0.05	30	490M9
							RAC	0.09	30	
							RAC	<0.05	30	490M2
							RAC	<0.05	30	490M9
Ontario County NY, USA	06/09/94	0.224			4		RAC	0.26	30	#96/5137 Mean of 4 analyses
							RAC	<0.05	30	490M2 Mean of 4 analyses
							RAC	<0.05	30	490M9 Mean of 4 analyses
Yates County NY, USA	02/09/94	0.224			4		RAC	0.18	30	#96/5137 Mean of 4 analyses

Location	Applications					Growth stage at last tr.	Sample	Residues. mg/kg	PHI, days	Report-No. and Remarks
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.					
							RAC	<0.05	30	490M2 Mean of 4 analyses
							RAC	<0.05	30	490M9 Mean of 4 analyses
Northampton County PA, USA	23/08/94	0.224			4		RAC	0.49	30	#96/5137 Mean of 4 analyses
							RAC	0.09	30	490M2 Mean of 4 analyses
							RAC	0.05	30	490M9 Mean of 4 analyses
Kent County MI, USA	16/08/94	0.224			4		RAC	0.43	30	#96/5137
							RAC	0.10	30	490M2
							RAC	0.07	30	490M9
Sampson County NC, USA	19/08/94	0.224			4		RAC	0.13	30	#96/5137
							RAC	0.07	30	490M2
							RAC	<0.05	30	490M9
							RAC	0.11	30	
							RAC	0.11	30	490M2
							RAC	<0.05	30	490M9
Matityahu, Israel	05/06/96	0.450	1500	0.030	7	fruit full size	RAC	0.27	21	#97/10668 5 replicates
Tulare County, CA, USA	08/09/94	0.672			4	mature	RAC	0.16	14	#97/5043 6 replicates
							RAC	0.05	14	490M2/6 replicates
							RAC	<0.05	14	490M9/6 replicates
							juice	<0.05	14	2 replicates
							juice	0.12	14	490M2/2 replicates
							juice	<0.05	14	490M9/2 replicates
							raisin	0.26	14	2 replicates
							raisin	0.08	14	490M2/2 replicates
							raisin	0.06	14	490M9/2 replicates
Ontario County, NY, USA	20/09/94	0.672			4	mature	RAC	1.82	14	#97/5043 4 replicates
							RAC	<0.05	14	490M2/4 replicates
							RAC	<0.05	14	490M9/4 replicates
							juice	0.13	14	2 replicates
							juice	0.08	14	490M2/2 replicates
							juice	<0.05	14	490M9/2 replicates
							raisin	2.82	14	2 replicates
							raisin	0.15	14	490M2/2 replicates
							raisin	0.16	14	490M9/2 replicates

* Average volume of the different treatments

Table 43. Supervised residue trials on bulb onions. Bulbs analysed.

	Applications									

Location	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI days	Report No. Residues determined
Üdemerbruch, Germany	04/09/95	0.205	255	0.080	7	48	<0.05	0	#97/10280
						48	<0.05	5	
						48	<0.05	7	
						48	<0.05	14	
						48	<0.05	21	
						48	<0.05	0	490M2
						48	<0.05	5	490M2
						48	<0.05	7	490M2
						48	<0.05	14	490M2
						48	<0.05	21	490M2
						48	0.10	0	490M9
						48	<0.05	5	490M9
						48	<0.05	7	490M9
						48	<0.05	14	490M9
						48	<0.05	21	490M9
Ottersum, Netherlands	04/09/95	0.203	252	0.081	7	48	<0.05	0	#97/10280
							<0.05	5	
							<0.05	7	
							0.06	14	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9
Siebengewald, Netherlands	11/09/95	0.205	255	0.080	7	48	<0.05	0	#97/10280
							<0.05	5	
							<0.05	7	
							<0.05	14	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9
NN Haps, Netherlands	19/09/95	0.206	256	0.080	7	48	<0.05	0	#97/10280
							<0.05	5	
							<0.05	7	
							<0.05	13	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	21	490M2

Location	Applications						Residues mg/kg	PHI days	Report No. Residues determined
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.			
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	13	490M9
							<0.05	21	490M9
Üdemerbruch, Germany	21/08/86	0.203	253	0.080	7	48	<0.05	0	#97/10281
							<0.05	5	
							<0.05	7	
							<0.05	14	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9
PS Slijk-Ewijk, Netherlands	21/08/86	0.205	255	0.080	7	48	<0.05	0	#97/10281
							<0.05	5	
							<0.05	7	
							<0.05	14	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9
Millingen, Netherlands	21/08/86	0.200	249	0.080	7	47	<0.05	0	#97/10281
							<0.05	5	
							<0.05	7	
							<0.05	14	
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9
Ottersum, Netherlands	12/08/96	0.200	249	0.080	7	48	<0.05	0	#97/10281
							<0.05	5	
							<0.05	7	
							<0.05	14	

Location	Applications					Growth stage at last tr.	Residues mg/kg	PHI days	Report No. Residues determined
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.				
							<0.05	21	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	21	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
							<0.05	21	490M9

Table 44. Supervised residue trials on cucumbers.

Location	Applications					Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
	Date of last treatment	kg ai/ha	Water l/ha	kg ai/hl	No.				
Sanlúcar de Barrameda, Spain	20/10/95	0.099	916*	0.011	4	69-87	<0.05	0	#97/10152
							<u>≤0.05</u>	5	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar, Spain	20/10/95	0.097	906*	0.011	4	69-85	<0.05	0	#97/10152
							<u>≤0.05</u>	5	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar, Spain	27/10/95	0.099	913*	0.011	4	69-88	<0.05	0	#97/10152
							<u>≤0.05</u>	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Sanlúcar, Spain	27/10/95	0.097	903*	0.011	4	69-86	0.46	0	#97/10152

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira, Spain	10/05/96	0.146	904*	0.016	4	69-75	<0.05	0	#97/10152
							<0.05	3	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira, Spain	20/05/96	0.128	778*	0.016	4	69-76	<0.05	0	#97/10152
							<0.05	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Palacios, Spain	04/06/96	0.144	888*	0.016	4	69-75	<0.05	0	#97/10152
							<0.05	3	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Palacios, Spain	04/06/96	0.144	888*	0.016	4	69-75	<0.05	0	#97/10152
							<0.05	3	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9

* Average volume of the different treatments

Table 45. Supervised residue trials on melons.

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
Alcala de Guadaira, Spain	14/06/96	0.150	900*	0.017	4	79	<0.05	0	#97/10155
							<0.05	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira, Spain	14/06/96	0.150	900*	0.017	4	78-79	<0.05	0	#97/10155
							<0.05	4	
							0.09	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	F 490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Palacios, Spain	14/06/96	0.150	900*	0.017	4	77-78	0.07	0	#97/10155
							0.11	4	
							0.07	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							0.06	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Palacios, Spain	07/08/96	0.150	900*	0.017	4	79-81	<0.05	0	#97/10155
							0.06	5	
							<0.05	7	
							<0.05	14	
							<0.05	0	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	5	
							<0.05	7	
							<0.05	14	
							<0.05	0	
							<0.05	5	
							<0.05	7	
							<0.05	14	
Sanlúcar, Spain	23/07/96	0.150	900*	0.017	4	73-81	0.07	0	#97/10155
							0.06	3	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar, Spain	23/07/96	0.150	900*	0.017	4	73-80	<0.05	0	#97/10155
							<0.05	3	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar, Spain	23/07/96	0.150	900*	0.017	4	73-81	0.05	0	#97/10155
							0.08	3	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Palacios, Spain	07/08/96	0.150	900*	0.017	4	79-80	0.10	0	#97/10155
							0.16	5	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	14	490M9
N-37-Esvres/Indre, France	26/07/96	0.150	900*	0.017	4	81	0.06	0	#98/10394

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							0.06	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
S-33-La Reole, France	25/07/96	0.150	900*	0.017	4	85	0.19	0	#98/10394
							0.08	4	
							0.09	6	
							0.06	13	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	6	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	6	490M9
							0.06	13	490M9
N-37-La Roche-Clermault, France	14/08/97	0.150	900*	0.017	4	mature	0.20	0	#98/10390
							0.16	4	
							0.08	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
N-37-Lemere, France	03/09/97	0.150	900*	0.017	4	83	<0.05	0	#98/10390
							0.05	5	
							<0.05	9	
							<0.05	15	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	9	490M2
							<0.05	15	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	9	490M9
							<0.05	15	490M9
Sanlúcar, Spain	10/10/97	0.150	900	0.017	4	89	0.13	4	#98/10218
							0.06	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9
Sanlúcar, Spain	10/10/97	0.150	900	0.017	4	89	0.07	4	

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							0.07	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9

* Average volume of the different treatments.

Table 46. Supervised residue trials on tomatoes in Spain.

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
Alcala de Guadaira	16/10/95	0.100	900	0.011	4	69-83	<0.05	0	#97/10144
							<0.05	3	
							<0.05	7	
							0.07	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira	16/10/95	0.100	900	0.011	4	69-83	0.06	0	#97/10144
							0.05	3	
							0.06	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Sanlúcar	20/10/95	0.100	900	0.011	4	69-83	0.07	0	#97/10144
							0.08	5	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar	27/10/95	0.100	900	0.011	4	68-82	<0.05	0	#97/10144
							0.06	4	
							0.05	7	
							0.11	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira	10/05/96	0.250	900	0.028	4	68-82	0.35	0	#97/10144
							0.31	3	
							0.25	7	
							0.10	14	
							<0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira	20/05/96	0.250	900	0.028	4	69-83	0.20	0	#97/10144
							0.14	4	
							0.13	7	
							0.08	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Los Palacios	20/05/96	0.250	900	0.028	4	69-82	0.26	0	#97/10144
							0.25	4	
							0.12	7	
							0.10	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Los Palacios	20/05/96	0.250	900	0.028	4	69-82	0.11	0	#97/10144
							0.09	4	
							0.08	7	
							0.06	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Los Palacios	24/10/97	0.250	900	0.028	4	76-78	0.17	4	#98/10217
							0.20	7	
							<0.05	4	490M2
							<0.05	7	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	4	490M9
							<0.05	7	490M9
Los Palacios	24/10/97	0.250	900	0.028	4	76-79	0.27	4	#98/10217
							0.18	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9
Sanlúcar	23/10/97	0.250	900	0.028	4	77-79	0.23	4	#98/10217
							0.16	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9
Sanlúcar	23/10/97	0.250	900	0.028	4	75-76	0.13	4	#98/10217
							0.08	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9

Table 47. Supervised residue trials on sweet peppers in Spain.

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
Sanlúcar	20/10/95	0.100	900	0.011	4	68-77	<0.05	0	#97/10144
							<0.05	5	
							<0.05	7	
							<0.05	13	
							<0.05	0	490M2
							<0.05	5	490M2
							<0.05	7	490M2
							<0.05	13	490M2
							<0.05	0	490M9
							<0.05	5	490M9
							<0.05	7	490M9
							<0.05	13	490M9
Sanlúcar	27/10/95	0.100	900	0.011	4	69-75	<0.05	0	#97/10144
							<0.05	4	
							<0.05	7	
							<0.05	14	
							<0.05	0	490M2
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadaira	14/06/96	0.250	900	0.028	4	77	0.15	0	#97/10144
							0.15	4	
							0.27	7	
							0.17	14	
							<0.05	0	490M2
							<0.05	4	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							0.05	7	490M2
							0.05	14	490M2
							<0.05	0	490M9
							<0.05	4	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Alcala de Guadair a	26/06/96	0.250	900	0.028	4	77-79	0.41	0	#97/10144
							0.21	3	
							0.15	7	
							0.14	14	
							0.05	0	490M2
							<0.05	3	490M2
							<0.05	7	490M2
							<0.05	14	490M2
							<0.05	0	490M9
							<0.05	3	490M9
							<0.05	7	490M9
							<0.05	14	490M9
Los Palacios	24/10/97	0.250	900	0.028	4	75-76	0.44	4	#98/10217
							0.38	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9
Los Palacios	03/11/97	0.250	900	0.028	4	75-76	0.39	4	#98/10217
							0.32	8	
							<0.05	4	490M2
							<0.05	8	490M2
							<0.05	4	490M9
							<0.05	8	490M9
Los Palacios	24/10/97	0.250	900	0.028	4	78-80	0.37	4	#98/10217
							0.36	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9
Sanlúcar	23/10/97	0.250	900	0.028	4	75-76	0.10	4	#98/10217
							0.16	8	
							<0.05	4	490M2
							<0.05	8	490M2
							<0.05	4	490M9
							<0.05	8	490M9
Sanlúcar	03/11/97	0.250	900	0.028	4	75-77	0.19	4	#98/10217
							0.11	8	
							<0.05	4	490M2
							<0.05	8	490M2
							<0.05	4	490M9
							<0.05	8	490M9
Sanlúcar	23/10/97	0.250	900	0.028	4	75-76	0.10	4	#98/10217
							0.12	7	
							<0.05	4	490M2
							<0.05	7	490M2
							<0.05	4	490M9
							<0.05	7	490M9

Table 48. Supervised residue trials on wheat (winter sown).

Table 48. Supervised residue trials on wheat (winter sown).

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
Bothkamp, Germany	27/06/94	0.105	300	0.035	2	61/63	whole plant	1.03	0	#94/11004 total
							ears	<0.05	21	total
							haulm	0.10	21	total
							straw	0.22	35	total
							grain	<0.05	35	total
							straw	0.07	42	total
							grain	<0.05	42	total
							whole plant	1.03	0	parent
							ears	<0.05	21	parent
							haulm	0.10	21	parent
							straw	0.08	35	parent
							grain	<0.05	35	parent
							straw	0.06	42	parent
							grain	<0.05	42	parent
							whole plant	<0.05	0	490M9
							ears	<0.05	21	490M9
							haulm	<0.05	21	490M9
							straw	0.15	35	490M9
							straw	<0.05	42	490M9
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							straw	<0.05	35	490M2
							straw	<0.05	42	490M2
Lippetal, Germany	08/06/93	0.105	300	0.035	2	61	whole plant	1.40	0	#94/11005 total
							ears	0.05	21	total
							haulm	0.29	21	total
							ears	<0.05	37	total
							haulm	0.25	37	total
							ears	<0.05	44	total
							haulm	0.09	44	total
							grain	<0.05	50	total
							straw	0.16	50	total
							whole plant	0.06	0	490M9
							ears	0.05	21	490M9
							haulm	0.06	21	490M9
							ears	<0.05	37	490M9
							haulm	0.06	37	490M9
							ears	<0.05	44	490M9
							haulm	<0.05	44	490M9
							straw	<0.05	50	490M9
							whole plant	1.34	0	parent
							ears	<0.05	21	parent
							haulm	0.23	21	parent
							ears	<0.05	37	parent
							haulm	0.19	37	parent
							ears	<0.05	44	parent
							haulm	0.09	44	parent
							grain	<0.05	50	parent

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							straw	0.09	50	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	37	490M2
							haulm	<0.05	37	490M2
							ears	<0.05	44	490M2
							haulm	<0.05	44	490M2
							straw	0.07	50	490M2
Bothkamp, Germany	27/6/94	0.125	300	0.042	2	61/63	forage	1.72	0	#94/11004 total
							ears	0.09	21	total
							haulm	0.38	21	total
							straw	0.79	35	total
							grain	<0.05	35	total
							straw	0.60	42	total
							grain	<0.05	42	total
							forage	1.66	0	parent
							ears	0.09	21	parent
							haulm	0.29	21	parent
							straw	0.50	35	parent
							grain	<0.05	35	parent
							straw	0.44	42	parent
							grain	<0.05	42	parent
							forage	0.06	0	490M9
							ears	<0.05	21	490M9
							haulm	0.08	21	490M9
							straw	0.21	35	490M9
							straw	0.08	42	490M9
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							straw	0.08	35	490M2
							straw	0.07	42	490M2
Lippetal, Germany	8/6/93	0.125	300	0.042	2	61	forage	1.11	0	#94/11005 total
							ears	0.13	21	total
							haulm	0.19	21	total
							ears	<0.05	37	total
							haulm	0.24	37	total
							ears	<0.05	44	total
							haulm	0.09	44	total
							grain	<0.05	50	total
							straw	0.18	50	total
							forage	0.06	0	490M9
							ears	0.06	21	490M9
							haulm	<0.05	21	490M9
							ears	<0.05	37	490M9
							haulm	0.06	37	490M9
							ears	<0.05	44	490M9
							haulm	<0.05	44	490M9
							straw	<0.05	50	490M9
							forage	1.05	0	parent
							ears	0.07	21	parent
							haulm	0.19	21	parent
							ears	<0.05	37	parent
							haulm	0.18	37	parent
							ears	<0.05	44	parent
							haulm	0.09	44	parent
							grain	<0.05	50	parent
							straw	0.12	50	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							haulm	<0.05	21	490M2
							ears	<0.05	37	490M2
							haulm	<0.05	37	490M2
							ears	<0.05	44	490M2
							haulm	<0.05	44	490M2
							straw	0.06	50	490M2
Izel les Equerchin, France	01/06/93	0.105	300	0.035	2	65	whole plant	2.06	0	#94/11005 total
							ears	<0.05	20	total
							haulm	0.05	20	total
							ears	<0.05	35	total
							haulm	0.05	35	total
							ears	<0.05	43	total
							haulm	<0.05	43	total
							grain	<0.05	62	total
							straw	<0.05	62	total
							whole plant	<0.05	0	490M9
							ears	<0.05	20	490M9
							haulm	<0.05	20	490M9
							ears	<0.05	35	490M9
							haulm	<0.05	35	490M9
							ears	<0.05	43	490M9
							haulm	<0.05	43	490M9
							straw	<0.05	62	490M9
							whole plant	2.06	0	parent
							ears	<0.05	20	parent
							haulm	0.05	20	parent
							ears	<0.05	35	parent
							haulm	0.05	35	parent
							ears	<0.05	43	parent
							haulm	<0.05	43	parent
							grain	<0.05	62	parent
							straw	<0.05	62	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	20	490M2
							haulm	<0.05	20	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							ears	<0.05	43	490M2
							haulm	<0.05	43	490M2
							straw	<0.05	49	490M2
Izel les Equerchin, France	1/6/93	0.125	300	0.042	2	65	forage	3.64	0	total
							ears	0.08	20	total
							haulm	0.16	20	total
							ears	<0.05	35	total
							haulm	0.17	35	total
							ears	<0.05	43	total
							haulm	0.07	43	total
							grain	<0.05	62	total
							straw	<0.05	62	total
							forage	0.08	0	490M9
							ears	0.08	20	490M9
							haulm	0.08	20	490M9
							ears	<0.05	35	490M9
							haulm	0.08	35	490M9
							ears	<0.05	43	490M9

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							haulm	<0.05	43	490M9
							straw	<0.05	62	490M9
							forage	3.56	0	parent
							ears	<0.05	20	parent
							haulm	0.08	20	parent
							ears	<0.05	35	parent
							haulm	0.09	35	parent
							ears	<0.05	43	parent
							haulm	0.07	43	parent
							grain	<0.05	62	parent
							straw	<0.05	62	parent
							forage	<0.05	0	490M2
							ears	<0.05	20	490M2
							haulm	<0.05	20	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							ears	<0.05	43	490M2
							haulm	<0.05	43	490M2
							straw	<0.05	62	490M2
Neuville, France	16/6/92	0.150	300	0.050	2	65	forage.	3.23	0	# 94/11003 total
							ears	<0.05	31	total
							haulm	0.18	31	total
							straw	<0.05	51	total
							grain	<0.05	51	total
							forage.	3.15	0	parent
							ears	<0.05	31	parent
							haulm	0.12	31	parent
							straw	<0.05	51	parent
							grain	<0.05	51	parent
							forage.	0.08	0	490M9
							ears	<0.05	31	490M9
							haulm	0.06	31	490M9
							straw	<0.05	51	490M9
							forage.	<0.05	0	490M2
							cars	<0.05	31	490M2
							haulm	<0.05	31	490M2
							straw	<0.05	51	490M2
Montot, France	26/5/92	0.15	300	0.050	2	65	forage.	3.66	0	total
							ears	0.06	30	total
							haulm	0.59	30	total
							straw	0.50	51	total
							grain	<0.05	51	total
							forage.	3.37	0	parent
							ears	<0.05	30	parent
							haulm	0.28	30	parent
							straw	0.26	51	parent
							grain	<0.05	51	parent
							forage.	0.21	0	490M9
							ears	0.06	30	490M9
							haulm	0.20	30	490M9
							straw	0.07	51	490M9
							forage.	0.08	0	490M2
							ears	<0.05	30	490M2
							haulm	0.11	30	490M2
							straw	0.17	51	490M2
Villenouvelle,	19/5/92	0.15	300	0.050	2	65	forage.	6.24	0	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
France										
							ears	<0.05	31	total
							haulm	0.19	31	total
							straw	0.07	57	total
							grain	<0.05	57	total
							forage.	5.86	0	parent
							ears	<0.05	31	parent
							haulm	0.13	31	parent
							straw	0.07	57	parent
							grain	<0.05	57	parent
							forage.	0.30	0	490M9
							ears	<0.05	31	490M9
							haulm	0.06	31	490M9
							straw	<0.05	57	490M9
							forage.	0.08	0	490M2
							ears	<0.05	31	490M2
							haulm	<0.05	31	490M2
							straw	<0.05	57	490M2

Table 49. Supervised residue trials on wheat (spring sown).

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues, mg/kg	PHI, days	Report No. Residues determined
Alken-Vanco, Belgium	20/06/94	0.105	300	0.035	2	61	whole plant	5.07	0	#94/11004 total
							ears	0.12	21	total
							haulm	1.54	21	total
							straw	3.15	33	total
							grain	<0.05	33	total
							straw	1.80	42	total
							grain	<0.05	42	total
							whole plant	4.92	0	parent
							ears	0.12	21	parent
							haulm	1.11	21	parent
							straw	2.59	33	parent
							grain	<0.05	33	parent
							straw	1.51	42	parent
							grain	<0.05	42	parent
							whole plant	0.15	0	490M9
							ears	<0.05	21	490M9
							haulm	0.34	21	490M9
							straw	0.42	33	490M9
							straw	0.19	42	490M9
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.08	21	490M2
							straw	0.13	33	490M2
							straw	0.10	42	490M2
Birkenheide, Germany	09/06/93	0.105	300	0.035	2	61	whole plant	4.18	0	#94/11005 total
							ears	0.16	21	total
							haulm	1.60	21	total
							grain	<0.05	37	total
							straw	1.80	37	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues, mg/kg	PHI, days	Report No. Residues determined
							grain	<0.05	42	total
							straw	0.71	42	total
							whole plant	0.21	0	490M9
							ears	0.09	21	490M9
							haulm	0.25	21	490M9
							straw	0.17	37	490M9
							straw	<0.05	42	490M9
							whole plant	3.97	0	parent
							ears	0.07	21	parent
							haulm	1.25	21	parent
							grain	<0.05	37	parent
							straw	1.45	37	parent
							grain	<0.05	42	parent
							straw	0.65	42	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.10	21	490M2
							straw	0.18	37	490M2
							straw	0.06	42	490M2
Borlo-Gingelom, Belgium	03/06/93	0.105	300	0.035	2	61	whole plant	2.19	0	#94/11005 total
							ears	0.07	21	total
							haulm	0.32	21	total
							ears	<0.05	35	total
							haulm	0.43	35	total
							grain	<0.05	42	total
							straw	0.36	42	total
							whole plant	0.13	0	490M9
							ears	<0.05	21	490M9
							haulm	0.07	21	490M9
							ears	<0.05	35	490M9
							haulm	0.17	35	490M9
							straw	0.07	42	490M9
							whole plant	2.06	0	parent
							ears	0.07	21	parent
							haulm	0.16	21	parent
							ears	<0.05	35	parent
							haulm	0.26	35	parent
							grain	<0.05	42	parent
							straw	0.24	42	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							straw	0.05	42	490M2
Niederbrechen, Germany	09/06/93	0.120	300	0.040	2	61	grain	<0.05	64	#94/11080
Niederbrechen, Germany	09/06/93	0.240	300	0.080	2	61	grain	<0.05	64	#94/11080
Niederbrechen, Germany	09/06/93	0.360	300	0.120	2	61	grain	<0.05	64	#94/11080
Alken-Vanco, Belgium	20/6/94	0.125	300	0.042	2	61	forage	5.83	0	#94/11004 total
							ears	0.30	21	total
							haulm	3.17	21	total
							straw	4.76	33	total
							grain	<0.05	33	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues, mg/kg	PHI, days	Report No. Residues determined
							straw	3.90	42	total
							grain	<0.05	42	total
							forage	5.73	0	parent
							ears	0.30	21	parent
							haulm	2.49	21	parent
							straw	4.00	33	parent
							grain	<0.05	33	parent
							straw	3.59	42	parent
							grain	<0.05	42	parent
							forage	0.11	0	490M9
							ears	<0.05	21	490M9
							haulm	0.53	21	490M9
							straw	0.60	33	490M9
							straw	0.19	42	490M9
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.16	21	490M2
							straw	0.17	33	490M2
							straw	0.12	42	490M2
Birkenheide, Germany	9/6/93	0.125	300	0.042	2	61	forage	4.17	0	#94/11005 total
							ears	0.16	21	total
							haulm	1.91	21	total
							grain	<0.05	37	total
							straw	1.64	37	total
							grain	<0.05	42	total
							straw	0.55	42	total
							forage	0.17	0	490M9
							ears	0.07	21	490M9
							haulm	0.20	21	490M9
							straw	0.17	37	490M9
							straw	<0.05	42	490M9
							forage	4.00	0	parent
							ears	0.09	21	parent
							haulm	1.61	21	parent
							grain	<0.05	37	parent
							straw	1.27	37	parent
							grain	<0.05	42	parent
							straw	0.47	42	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.10	21	490M2
							straw	0.20	37	490M2
							straw	0.08	42	490M2
Borlo-Gingelom, Belgium	3/6/93	0.125	300	0.042	2	61	forage	1.65	0	#94/11005 total
							ears	0.12	21	total
							haulm	0.33	21	total
							ears	<0.05	35	total
							haulm	0.10	35	total
							grain	<0.05	42	total
							straw	0.12	42	total
							forage	0.13	0	490M9
							ears	0.06	21	490M9
							haulm	0.17	21	490M9
							ears	<0.05	35	490M9
							haulm	0.10	35	490M9

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues, mg/kg	PHI, days	Report No. Residues determined
							straw	0.06	42	490M9
							forage	1.52	0	parent
							ears	0.06	21	parent
							haulm	0.16	21	parent
							ears	<0.05	35	parent
							haulm	<0.05	35	parent
							grain	<0.05	42	parent
							straw	<0.05	42	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							straw	0.06	42	490M2

Table 50. Supervised residue trials on barley (winter sown).

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
Ven-Zelderheide and Netherlands	27/5/94	0.105	300	0.035	2	61	forage	2.02	0	#94/11004 total
							ears	0.09	21	total
							haulm	0.14	21	total
							ears	<0.05	34	total
							haulm	0.07	34	total
							straw	0.34	42	total
							grain	<0.05	42	total
							forage	2.02	0	parent
							ears	<0.05	21	parent
							haulm	0.14	21	parent
							ears	<0.05	34	parent
							haulm	0.07	34	parent
							straw	0.13	42	parent
							grain	<0.05	42	parent
							forage	<0.05	0	490M9
							ears	0.09	21	490M9
							haulm	<0.05	21	490M9
							ears	<0.05	34	490M9
							haulm	<0.05	34	490M9
							straw	0.12	42	490M9
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	34	490M2
							haulm	<0.05	34	490M2
							straw	0.08	42	490M2
Niederhofen, Germany	19/5/93	0.105	300	0.035	2	69	forage	2.43	0	#94/11005 total
							ears	<0.05	21	total
							haulm	0.38	21	total
							ears	<0.05	35	total
							haulm	0.13	35	total
							grain	<0.05	42	total
							straw	0.07	42	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							forage	0.09	0	490M9
							ears	<0.05	21	490M9
							haulm	<0.05	21	490M9
							ears	<0.05	35	490M9
							haulm	<0.05	35	490M9
							straw	<0.05	42	490M9
							forage	2.34	0	parent
							ears	<0.05	21	parent
							haulm	0.29	21	parent
							ears	<0.05	35	parent
							haulm	0.08	35	parent
							grain	<0.05	42	parent
							straw	<0.05	42	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.09	21	490M2
							ears	<0.05	35	490M2
							haulm	0.05	35	490M2
							straw	<0.05	42	490M2
Montot, France	15/5/93	0.105	300	0.035	2	65	forage	1.97	0	#94/11005 total
							ears	<0.05	20	total
							haulm	0.29	20	total
							grain	<0.05	33	total
							straw	0.20	33	total
							grain	<0.05	40	total
							straw	0.07	40	total
							forage	<0.05	0	490M9
							ears	<0.05	20	490M9
							haulm	<0.05	20	490M9
							straw	0.06	33	490M9
							straw	<0.05	40	490M9
							forage	1.97	0	parent
							ears	<0.05	20	parent
							haulm	0.29	20	parent
							grain	<0.05	33	parent
							straw	0.14	33	parent
							grain	<0.05	40	parent
							straw	0.07	40	parent
							forage	<0.05	0	490M2
							ears	<0.05	20	490M2
							haulm	<0.05	20	490M2
							straw	<0.05	33	490M2
							straw	<0.05	40	490M2

Table 51. Supervised residue trials on barley (spring sown).

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
Holzen, Germany	23/06/94	0.105	300	0.035	2	61	whole plant	1.47	0	#94/11004 total
							ears	0.06	21	total
							haulm	0.33	21	total
							straw	0.53	35	total
							grain	<0.05	35	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							straw	0.37	42	total
							grain	<0.05	42	total
							whole plant	1.47	0	parent
							ears	0.06	21	parent
							haulm	0.26	21	parent
							straw	0.28	35	parent
							grain	<0.05	35	parent
							straw	0.15	42	parent
							grain	<0.05	42	parent
							whole plant	<0.05	0	490M9
							ears	<0.05	21	490M9
							haulm	0.07	21	490M9
							straw	0.11	35	490M9
							straw	0.10	42	490M9
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							straw	0.14	35	490M2
							straw	0.11	42	490M2
Bothcamp, Germany	07/06/93	0.105	300	0.035	2	63	whole plant	1.58	0	#94/11005 total
							ears	0.12	21	total
							haulm	0.39	21	total
							ears	<0.05	35	total
							haulm	0.28	35	total
							ears	<0.05	42	total
							haulm	0.26	42	total
							grain	<0.05	49	total
							straw	0.06	49	total
							whole plant	<0.05	0	490M9
							ears	0.06	21	490M9
							haulm	0.11	21	490M9
							ears	<0.05	35	490M9
							haulm	0.08	35	490M9
							ears	<0.05	42	490M9
							haulm	0.08	42	490M9
							straw	0.06	42	490M9
							whole plant	1.58	0	parent
							ears	0.06	21	parent
							haulm	0.23	21	parent
							ears	<0.05	35	parent
							haulm	0.20	35	parent
							ears	<0.05	42	parent
							haulm	0.18	42	parent
							grain	<0.05	49	parent
							straw	<0.05	49	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							ears	<0.05	42	490M2
							haulm	<0.05	42	490M2
							straw	<0.05	49	490M2
Gennep, Netherlands	02/06/93	0.105	300	0.035	2	61	whole plant	2.84	0	#94/11005 total
							ears	<0.05	21	total

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							haulm	0.71	21	total
							ears	<0.05	34	total
							haulm	0.60	34	total
							grain	<0.05	43	total
							straw	0.55	43	total
							whole plant	0.07	0	490M9
							ears	<0.05	21	490M9
							haulm	0.10	21	490M9
							ears	<0.05	34	490M9
							haulm	0.07	34	490M9
							straw	0.07	42	490M9
							whole plant	2.77	0	parent
							ears	<0.05	21	parent
							haulm	0.55	21	parent
							ears	<0.05	34	parent
							haulm	0.45	34	parent
							grain	<0.05	43	parent
							straw	0.36	43	parent
							whole plant	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.06	21	490M2
							ears	<0.05	34	490M2
							haulm	0.08	34	490M2
							straw	0.12	43	490M2
Hünstetten-Ketternschwalbach, Germany	21/06/93	0.120	300	0.040	2	61	grain	<0.05	46	#94/11158
Hünstetten-Ketternschwalbach, Germany	21/06/93	0.240	300	0.080	2	61	grain	<0.05	46	#94/11158
Hünstetten-Ketternschwalbach, Germany	21/06/93	0.360	300	0.120	2	61	grain	<0.05	46	#94/11158
Holzen, Germany	0.125	300	0.042	23/6/94	2	61	forage	1.94	0	#94/11004 total
							ears	0.18	21	total
							haulm	0.50	21	total
							straw	1.06	35	total
							grain	<0.05	35	total
							straw	0.80	42	total
							grain	<0.05	42	total
							forage	1.94	0	parent
							ears	0.12	21	parent
							haulm	0.37	21	parent
							straw	0.79	35	parent
							grain	<0.05	35	parent
							straw	0.63	42	parent
							grain	<0.05	42	parent
							forage	<0.05	0	490M9
							ears	0.06	21	490M9
							haulm	0.08	21	490M9
							straw	0.13	35	490M9
							straw	0.08	42	490M9
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	0.06	21	490M2
							straw	0.14	35	490M2
							straw	0.10	42	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
Bothcamp, Germany	0.125	300	0.042	7/6/93	2	63	forage	1.97	0	#94/11005 total
							ears	0.15	21	total
							haulm	0.25	21	total
							ears	0.06	35	total
							haulm	0.43	35	total
							ears	<0.05	42	total
							haulm	0.16	42	total
							grain	<0.05	49	total
							straw	0.06	49	total
							forage	<0.05	0	490M9
							ears	0.06	21	490M9
							haulm	<0.05	21	490M9
							ears	<0.05	35	490M9
							haulm	0.11	35	490M9
							ears	<0.05	42	490M9
							haulm	<0.05	42	490M9
							straw	0.06	49	490M9
							forage	1.97	0	parent
							ears	0.09	21	parent
							haulm	0.25	21	parent
							ears	0.06	35	parent
							haulm	0.26	35	parent
							ears	<0.05	42	parent
							haulm	0.16	42	parent
							grain	<0.05	49	parent
							straw	<0.05	49	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	0.06	35	490M2
							ears	<0.05	42	490M2
							haulm	<0.05	42	490M2
							straw	<0.05	49	490M2
Gcnncp, Netherlands	0.125	300	0.042	2/6/93	2	61	forage	4.16	0	#94/11005 total
							ears	0.11	21	total
							haulm	1.35	21	total
							ears	0.06	34	total
							haulm	1.17	34	total
							grain	<0.05	43	total
							straw	1.01	43	total
							forage	0.06	0	490M9
							ears	<0.05	21	490M9
							haulm	0.11	21	490M9
							ears	<0.05	34	490M9
							haulm	0.13	34	490M9
							straw	0.09	43	490M9
							forage	4.10	0	parent
							ears	0.11	21	parent
							haulm	1.16	21	parent
							ears	0.06	34	parent
							haulm	0.92	34	parent
							grain	<0.05	43	parent
							straw	0.75	43	parent
							forage	<0.05	0	490M2

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI, days	Report No. Residues determined
							ears	<0.05	21	490M2
							haulm	0.08	21	490M2
							ears	<0.05	34	490M2
							haulm	0.12	34	490M2
							straw	0.17	43	490M2
Castelnau d'Estr., France	0.150	300	0.050	22/5/92	2	75	forage	4.17	0	# 94/11003 total
							ears	<0.05	28	total
							haulm	0.19	28	total
							straw	0.22	42	total
							grain	<0.05	42	total
							forage	4.17	0	parent
							ears	<0.05	28	parent
							haulm	0.14	28	parent
							straw	0.22	42	parent
							grain	<0.05	42	parent
							forage	4.22	0	490M9
							ears	<0.05	28	490M9
							haulm	<0.05	28	490M9
							straw	<0.05	42	490M9
							forage	<0.05	0	490M2
							ears	<0.05	28	490M2
							haulm	0.05	28	490M2
							straw	<0.05	42	490M2

Table 52. Supervised residue trials on rye (winter sown).

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI days	Report No. Residues determined
Limburgerhof and Germany	14/5/93	0.105	300	0.035	2	69	forage	1.13	0	# 94/11005 total
							ears	0.15	21	total
							haulm	0.36	21	total
							ears	0.09	35	total
							haulm	0.27	35	total
							ears	0.06	42	total
							haulm	0.26	42	total
							grain	<0.05	49	total
							straw	0.18	49	total
							forage	0.06	0	490M9
							ears	0.08	21	490M9
							haulm	0.21	21	490M9
							ears	0.09	35	490M9
							haulm	0.19	35	490M9
							ears	0.06	42	490M9
							haulm	0.19	42	490M9
							straw	0.12	49	490M9
							forage	1.07	0	parent
							ears	0.07	21	parent
							haulm	0.07	21	parent
							ears	<0.05	35	parent
							haulm	0.08	35	parent
							ears	<0.05	42	parent
							haulm	0.07	42	parent

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Sample	Residues mg/kg	PHI days	Report No. Residues determined
							grain	<0.05	49	parent
							straw	<0.05	49	parent
							forage	<0.05	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							ears	<0.05	42	490M2
							haulm	<0.05	42	490M2
							straw	0.06	49	490M2
Limburgerhof, Germany	14/5/93	0.125	300	0.042	2	69	forage	1.97	0	# 94/11005 total
							ears	0.16	21	total
							haulm	0.39	21	total
							ears	<0.05	35	total
							haulm	0.30	35	total
							ears	0.10	42	total
							haulm	0.35	42	total
							grain	<0.05	49	total
							straw	0.29	49	total
							forage	0.23	0	490M9
							ears	0.06	21	490M9
							haulm	0.22	21	490M9
							ears	0.19	35	490M9
							haulm	0.19	35	490M9
							ears	0.10	42	490M9
							haulm	0.20	42	490M9
							straw	0.13	49	490M9
							forage	1.60	0	parent
							ears	0.10	21	parent
							haulm	0.17	21	parent
							ears	<0.05	35	parent
							haulm	0.11	35	parent
							ears	<0.05	42	parent
							haulm	0.10	42	parent
							grain	<0.05	49	parent
							straw	0.08	49	parent
							forage	0.14	0	490M2
							ears	<0.05	21	490M2
							haulm	<0.05	21	490M2
							ears	<0.05	35	490M2
							haulm	<0.05	35	490M2
							ears	<0.05	42	490M2
							haulm	0.05	42	490M2
							straw	0.08	49	490M2

Table 53. Supervised residue trials on pecans, USA. Kernels analysed.

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
Mitchell County, GA	01/10/96	0.224	467	0.048	8	mature fruit	<0.05	35	#97/5064
							<0.05	35	490M2
							<0.05	35	490M9

Location	Date of last treatment	Applications kg ai/ha	Water l/ha	kg ai/hl	No.	Growth stage at last tr.	Residues mg/kg	PHI, days	Report No. Residues determined
							<0.05	45	
							<0.05	45	490M2
							<0.05	45	490M9
							<0.05	55	
							<0.05	55	490M2
							<0.05	55	490M9
							<0.05	65	
							<0.05	65	490M2
							<0.05	65	490M9
Mitchell County, GA	01/10/96	0.224	2335	0.010	8	mature fruit	<0.05	35	#97/5064
							<0.05	35	490M2
							<0.05	35	490M9
							<0.05	45	
							<0.05	45	490M2
							<0.05	45	490M9
							<0.05	55	
							<0.05	55	490M2
							<0.05	55	490M9
							<0.05	65	
							<0.05	65	490M2
							<0.05	65	490M9
Houston County, AL	01/10/96	0.224	467	0.048	8	mature fruit	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
							<0.05	45	
							<0.05	45	490M2
							<0.05	45	490M9
Tift County, GA	13/09/96	0.224	467	0.048	8	nut fill	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
							<0.05	45	
							<0.05	45	490M2
							<0.05	45	490M9
Washington County, MS	15/10/96	0.224	467	0.048	8	fruiting	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
Washington County, MS	15/10/96	0.224	2335	0.010	8	fruiting	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
Uvalde County, TX	27/08/96	0.224	467	0.048	8	nut past gel	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
Uvalde County, TX	27/08/96	0.224	2335	0.010	8	nut past gel	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
Lubbock County, TX	22/10/96	0.224	467	0.048	8	mature fruit	<0.05	45	#97/5064
							<0.05	45	490M2
							<0.05	45	490M9
Lubbock County, TX	22/10/96	0.224	2335	0.010	8	mature fruit	<0.05	45	
							<0.05	45	490M2
							<0.05	45	490M9

Livestock feeding trials

Cows. In a study in the UK during 1994, 11 lactating Friesian cows were dosed twice daily with kresoxim-methyl at 120, 360 or 1200 mg/cow/day, equivalent to 6, 18 or 60 ppm in the feed, for 28 or 29 days with an undosed control for each group. Three cows from each group were slaughtered on the day of the final dose. Two additional cows from the high-dose group were fed the basal diet for 2 or 7 days after the last dose.

Milk samples, taken twice daily and combined to give daily samples, were stored at 4°C before mixing and overnight before analysis. On days 1, 14 and 28 only, additional 5-litre samples were retained from the total 24-hour milk production of each cow and separated by centrifugation into cream and skimmed milk. Changes in milk yield were reported to be within normal limits. Residues of 490M2 and 490M9 in whole milk, cream and skimmed milk were all <0.002 mg/kg (<2 µg/l).

The residues in the tissues are shown in Table 54. The parent compound was not sought. Samples were stored up to 175 days before analysis. The highest residues occurred in the kidneys, principally as 490M1 which was present at slaughter in all cows. 490M1 also occurred in the highest dose group in the liver, peritoneal fat and subcutaneous fat, and in the 360 ppm group in the liver and peritoneal fat. 490M9 was found in the liver and kidneys at the higher doses. 490M2 residues were all <0.01 mg/kg. Residues generally increased with increasing dose.

After 2 days withdrawal only 490M1 was still present in the liver and kidneys. By seven days there were no residues of 490M1 or 490M9 above 0.01 mg/kg in the liver, but a single residue was found in the kidneys (Redgrave, 1994).

Table 54. Residues of kresoxim-methyl metabolites in cow tissues after dosing at 120, 360 and 1200 mg/day.

Metabolite	Group	Dose level	Residue concentration , mg/kg				
		mg/day	Liver	Kidney	Muscle	Subcutaneous fat	Peritoneal fat
490M1	A	0	nd	<0.01	nd	nd	nd
	B	120	nd	0.021-0.028	<0.01	<0.01	<0.01
	C	360	0.012-0.028	0.054-0.13	<0.01	<0.01	<0.01-0.033
	D	1200	<0.01-0.036	<0.01-0.29	<0.01	<0.01-0.02	<0.01-0.091
490M2	A	0	nd	nd	nd	nd	nd
	B	120	<0.01	nd	<0.01	nd	nd
	C	360	<0.01	<0.01	nd	nd	nd
	D	1200	<0.01	<0.01	<0.01	<0.01	<0.01
490M9	A	0	nd	nd	nd	nd	nd
	B	120	nd	nd	<0.01	nd	nd
	C	360	<0.01-0.015	0.014-0.023	<0.01	nd	nd
	D	1200	<0.01-0.024	<0.01-0.049	<0.01	<0.01	<0.01

nd: not detectable, <0.002 mg/kg

FATE OF RESIDUES IN STORAGE AND PROCESSING

In storage

No information.

In processing

Residues in processed products were determined in some of the residue trials on apples and grapes. The results are repeated, together with the corresponding processing factors, in Table 55.

Table 55. Residues of kresoxim-methyl in processed products of apples and grapes.

Residue, mg/kg, and (calculated processing factor)						
Raw apple	Washed apple	Apple juice	Wet pomace	Apple sauce		
0.16	0.19 (1.19)	<0.05 (<0.31)	<0.05 (<0.31)	<0.05 (<0.31)		
0.19	0.07 (0.37)	<0.05 (<0.26)	0.09 (0.47)	<0.05 (<0.26)		
0.08	0.16 (2)	<0.05 (<0.63)	0.17 (2.1)	<0.05 (<0.63)		
<0.05	-	<0.05	<0.05	-		
Mean factor	1.2	<0.4	≤1	<0.4		
Grapes	Must 1 after heating	Must 2 after pressing	Wet pomace	Wine	Rosé wine	Red wine
0.25	<0.05 (<0.2).	<0.05	0.57	<0.05 (<0.2). <0.05 (<0.2)	<0.05 (<0.2)	<0.05 (<0.2)
0.73	0.06 (0.08)	0.19	1.4			
0.44	0.07 (0.16).	0.08	0.38	<0.05 (<0.11)		
0.17	<0.05 (<0.29)	0.09	0.52		<0.05 (<0.29)	<0.05 (<0.29)
Mean factor	0.1	0.1	0.7	0.2	<0.2	<0.2
Grapes	Juice	Raisins				
0.16	<0.05 (<0.31)	0.26 (1.63)				
1.82	0.13 (0.071)	2.82 (1.55)				
Mean factor	0.07	1.6				

In a brewing study barley was treated at 0.25 kg ai/ha (twice the GAP application rate) with kresoxim-methyl. Two malts were used to prepare an ale beer in a 1:100 scale pilot brewery. Three brews were carried out for each malt with serial repitching of the yeast into the next brew of the series. Residues in the initial grain and in the beer were all <0.05 mg/kg (BASF, 1997).

Residues in the edible portion of food commodities

The only information on residues in the edible portion of commodities apart from the processing studies was on residues in the kernels of pecans (Table 53). The residues were all <0.05 mg/kg.

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

No information.

NATIONAL MAXIMUM RESIDUE LIMITS

The national MRLs shown below were reported (BASF, 1998). There are no harmonised EU MRLs.

Country	MRL, mg/kg, and commodity
Austria	-
Belgium	0.05 pome fruits, other vegetable food
Brazil	-
Denmark	-
European Union	-
Finland	-
France	0.5 grapes 0.1 apple & pear 0.05 cereals
Germany	0.05 other vegetable food
Hungary	0.50 wine grapes, table grapes 0.05 apple
Ireland	-
Israel	0.5 wine grapes, table grapes 0.1 strawberries
Italy	0.05 apple, pear
Japan	15 grapes 10 orange & apricot 5 barley, kaki plum, apple & pear 2 mandarin, sweet pepper & welsh onion 1 kiwifruit 0.5 peach, cucumber & summer squash 0.1 wheat, sugar beet & garlic
Luxembourg	-
Netherlands	0.05 all vegetable food
Norway	-
Portugal	-
South Africa	0.10 apple, pear
Spain	0.5 grapes 0.05 apple, pear
Sweden	-
Switzerland	1 wine grapes, table grapes 0.05 cereals (grain), pome fruits
Taiwan	-
UK	0.05 barley (grain), wheat (grain) Estimated by UK on the basis of the trials data but not established in statute.
USA	-

- No MRLs

The definition of the residues for plant commodities is kresoxim-methyl for all the MRLs listed. Various definitions of the residue in animal products were reported by the manufacturer, all based on one or more of the metabolites 490M1, 490M2 and 490M9.

APPRAISAL

Kresoxim-methyl was considered for the first time by the current Meeting. It is used as a broad spectrum fungicide structurally related to Strobilurin A, a natural product of the wood-decaying fungus *Strobilurus tenacellus*. It is a member of a new class of biologically active compounds, the strobilurins, and is formulated as an SC, WG or SE.

Pure kresoxim-methyl is a white crystalline solid with a melting point of *c.* 102°C and low volatility. It has limited solubility in water with medium-high solubility in certain organic solvents. The log octanol-water partition coefficient of 3.4 suggests bioaccumulation may occur. Kresoxim-methyl does not dissociate at neutral pH, but the acid dissociation constant of the free acid 490M1 (pKa 4.2) indicates dissociation at neutral pH.

The main metabolites are identified by code numbers as shown below.

Code	Chemical name
parent	methyl (*E*)-methoxyimino[∀-(*o*-tolyloxy)-*o*-tolyl]acetate
490M0	methyl (*Z*)-methoxyimino[∀-(*o*-tolyloxy)-*o*-tolyl]acetate
490M1	(*E*)-methoxyimino[∀-(*o*-tolyloxy)-*o*-tolyl]acetic acid
490M2	∀-[(*o*-hydroxymethyl)phenoxy]-*o*-tolyl(methoxyimino)acetic acid
490M4	∀-(*o*-carboxyphenoxy)-*o*-tolyl(methoxyimino)acetic acid
490M8	∀-[*p*-hydroxy-(*o*-hydroxy)methylphenoxy]-*o*-tolyl(methoxyimino)acetic acid
490M9	α-(*p*-hydroxy-*o*-tolyloxy)-*o*-tolyl(methoxyimino)acetic acid
490M15	methyl α-(*p*-hydroxy-*o*-tolyloxy)-*o*-tolyl(methoxyimino)acetate
490M48	methyl hydroxyimino[∀-(2-methoxyphenoxymethyl)phenyl]acetate

Animal metabolism and environmental fate

Animal metabolism

Metabolism of absorbed kresoxim-methyl in rats was rapid and produced a large number of metabolites of which 34, including conjugates, were identified in the tissues and/or excreta. Ester cleavage to form the free acid 490M1 is a fast and important initial reaction. Other reactions involve cleavage of the oxime and benzyl ether bonds, ring hydroxylation, side chain oxidation and several conjugation reactions.

Goats were given daily doses of radiolabelled kresoxim-methyl equivalent to 7.1 or 450 ppm diet for 5 or 8 days respectively. Most of the dose was excreted (59-69% in the urine, 18-24% in the faeces). Apart from the excreta, the highest residue levels were in the kidneys and bile. Transfer into the milk and other edible tissues was low. The total radioactive residue (TRR) from the low dose was below 0.01 mg/kg as kresoxim-methyl in the milk, muscle and fat: 0.038 mg/kg in the liver and 0.142 mg/kg in the kidneys. The main metabolites identified in the liver and kidney extracts were 490M9 (1.9 and 4.0 mg/kg respectively), 490M1 (0.8 and 2.9 mg/kg) and 490M2 (0.5 and 4.6 mg/kg). 490M6, 490M18 and 490M19 were minor products. Three metabolites in the goats had not been identified in rats, of which the minor metabolite 490M18 was at the highest concentration (0.12 mg/kg in the ethyl acetate extract of the liver from the high-dosed goat), but the Meeting agreed that in practice concentrations of 490M18 would be very low (<0.01 mg/kg) in commodities of animal origin. Kresoxim-methyl itself was detected only in the faeces and fat.

Hens were given radiolabelled kresoxim-methyl in six daily doses equivalent to 10 or 180 ppm in the diet. 71-82.6% of the radioactivity recovered from the low dose was excreted and the total radioactive residue levels in the skin, kidneys and liver were 0.009, 0.065 and 0.082 mg/kg kresoxim-methyl equivalents respectively. The ^{14}C in eggs sampled at the end of the study was equivalent to 0.012 mg/kg and 0.215 mg/kg from the low and high doses respectively and did not appear to have reached a plateau. Metabolites were identified only in the high-dose group. A number of metabolites were produced, of which 490M9 was the most prominent with residues of 1.35 mg/kg in the liver. Two major metabolites in goats were 490M2 and 490M9. 490M2 was not identified in hens and 490M9 was found only in the eggs at 0.005 mg/kg. The parent compound was identified in the eggs, skin, muscle and fat at 0.01, 0.08, 0.005 and 0.31 mg/kg respectively.

Apples were sprayed with [p*henyl*-^{14}C]kresoxim-methyl at (1) 6 x 0.4 kg/ha, PHI 14 days (2) 2 x 0.4 kg ai/ha, PHI 149 days, or (3) 2 x 0.8 kg/ha, PHI 14 days. The total radioactive residues (TRR) in or on the apples were 0.36 mg/kg from (1), 0.04 mg/kg from (2) and 0.84 mg/kg from (3). When trees were sprayed with fruit present the radioactivity remained mainly on the peel (89%-98% of the TRR) and translocation to the pulp was low after 14 days. Extracts from all three experiments showed similar patterns of metabolites, containing predominantly unchanged kresoxim-methyl (74%-93% of

the TRR). The extracts from (1), in which the fruit was present at the time of treatment, contained kresoxim-methyl (78.3% of the TRR), 490M0 (3.3% of the TRR), the acid 490M1 (3.0%) and conjugates of the alcohol-acid 490M2 (1.8%) and phenol-acid 490M9 (2.1%). Kresoxim-methyl appeared to be translocated within the apple tree and to be persistent, since it was found in the fruit above the limit of determination 149 days after an early treatment when the fruit would not have been present. However, the Meeting concluded that this was not entirely consistent with the low water-solubility and the relatively low residues of the parent compound in crops shortly after treatment, and drew attention to the possibility that the parent compound found in the fruit 149 days after treatment may have been the result of methylation of the metabolite 490M1 during methanol extraction of the samples.

The metabolism of [*phenyl*-^{14}C]kresoxim-methyl was investigated in wheat treated twice at 0.25 kg ai/ha at an interval of 56 days. The total radioactive residues were 0.06 mg/kg in the grain and 9.21 mg/kg in the straw 64 days after the second application, and 1.31 mg/kg in the forage 55 days after the first. 30-99% of the TRR could be extracted with methanol, the extractability from mature grain being low. Subsequent extraction with dilute aqueous ammonia released an additional 31% of the TRR from grain and 16% from straw. Unextractable residues were 0.27 mg/kg in straw (2.9% of the TRR) and 0.025 mg/kg in grain (38.8% of the TRR).

Most of the radioactivity was due to unchanged parent compound at levels of 5.9 mg/kg in the straw after both treatments and 0.98 mg/kg in the forage one day before second (-1 day forage). Other compounds identified in the straw and -1 day forage were 490M0, the acid 490M1 and conjugates of the alcohol-acid 490M2 and the phenol-acid 490M9. The grain extract contained 0.011 mg/kg kresoxim-methyl and a variety of other metabolites constituting 0.3-5.6% of the TRR. Enzymatic treatment of conjugate fractions yielded 0.03 mg/kg 490M2 and 0.103 mg/kg 490M9 in -1 day forage, and 0.39 mg/kg 490M2 and 1.04 mg/kg 490M9 in straw. Samples from a 1.25 kg ai/ha treatment contained higher relative and absolute amounts of the parent compound. No cleavage of the phenyl or phenoxy rings was observed. Kresoxim-methyl was apparently translocated within the plant since grain contained determinable residues of the parent compound after two treatments although the grain was not present at the time of the second treatment (growth stage 52). As with apples the Meeting noted the possibility that the residues of kresoxim-methyl found in the grain at harvest may have been the result of methylation of 490M1 during methanol extraction. No experimental clarification was reported.

Grapes. The metabolism of phenyl- and phenoxy-labelled kresoxim-methyl was investigated in grapes treated at rates equivalent to a total dose of 2.5 kg/ha. The total radioactive residues from the phenoxy and phenyl labels were equivalent to 3.8-4.0 mg/kg and 3.6-4.7 mg/kg respectively. Kresoxim-methyl was the main compound in the residue: 55-57% of the TRR, 2.2-2.7 mg/kg. Conjugated 490M2 accounted for 8.8-13.8% of the TRR. After treatment with β-glucosidase, 490 M9 accounted for 4.4-5.7% of the TRR and 490 M54 for 1.4-2.1%. Unextractable residues accounted for 4.0-4.1%. There were no major qualitative differences between the metabolism of the phenyl and the phenoxy labels and no ring cleavage was observed. The metabolite 490 M54 was not identified as a product of wheat, apple or rat metabolism. The Meeting concluded that in practice concentrations of 490 M54 would be very low (<0.01mg/kg) in grapes treated according to GAP.

In studies carried out to assess metabolism in rotational crops, phenyl-labelled kresoxim-methyl was applied to bare soils at a rate of 0.3 kg/ha. After being aged for 30 days, the soils were diluted with untreated soils at a ratio of 1:9 to simulate ploughing, and spring wheat, green beans, carrots and lettuce were planted. The highest total radioactive residues at harvest, expressed as mg/kg kresoxim-methyl, were 0.15 in wheat straw, 0.007 in wheat grain, 0.21 in bean forage, 0.009 in green beans, 0.006 in carrot roots, 0.047 in carrot foliage and 0.01 in lettuce leaves. In bean forage, carrot forage and lettuce, conjugates constituted the main radioactive residue, accounting for 0.071 mg/kg, 0.015 mg/kg and 0.012 mg/kg respectively. Enzymatic cleavage yielded mainly the aglycones 490M2

and 490M9. Lettuce contained 0.003 mg/kg kresoxim-methyl and carrot forage 0.005 mg/kg 490M1. Wheat straw contained the free hydroxy metabolites 490M2 and 490M9 (together 0.011 mg/kg). Enzyme treatment of extracts of wheat straw produced 4.8% of the TRR as 490M2 and 10.4% as 490M9. No parent compound was detected in wheat, bean or carrot forage. Metabolites in grain extracts were not characterized. The results confirm the expectation that significant residues of kresoxim-methyl would not occur because of its rapid degradation in soil. (Half-lives in soils were 1-3 days for kresoxim-methyl and 38-131 days for 490M1, and DT90s for combined parent compound and 490M1 in the field were 18-25 days; see below).

Environmental fate in soil and water/sediment systems

Both aerobic and anaerobic degradation of kresoxim-methyl in soil produced 490M1 (the free acid) in amounts representing 66-84% of the applied radioactivity (AR). In aerobic conditions this was then degraded to CO_2 (27-43% of the AR in 180 days and 24% of the AR in 1 year in different experiments) or bound residues (a maximum of 36-47% of the AR) with 490M4 found in very small amounts as an intermediate. The bound radioactivity still unextractable after treatment with aqueous alkali was largely associated with the humin fraction.

In sterile conditions some degradation of kresoxim-methyl occurred but the rate was considerably slower than that in anaerobic or aerobic conditions. In anaerobic and sterile conditions the degradation of 490M1 was too slow to measure and levels of CO_2 and bound residues were considerably lower.

In aerobic conditions at 20°C and average moisture contents (usually 40% of the maximum water-holding capacity) the degradation of kresoxim-methyl, largely to 490M1, was extremely rapid with DT90 values of 2-3 days. The 490M1 was subsequently degraded with a half-life of 38-131 days.

In anaerobic conditions the DT90 for kresoxim-methyl was also <3 days. In photolysis studies degradation was more rapid in the dark controls than in the irradiated samples, which could have been caused by loss of moisture in the irradiated soil resulting in slower aerobic degradation.

In field studies undertaken in Germany in May, the DT50 values for the combined dissipation of kresoxim-methyl and 490M1 were 8-38 days and the DT90 values 18-125 days. The dissipation of 490M1 was mainly measured since substantial dissipation of kresoxim-methyl had already occurred in the samples taken on day 0 and no residues were determinable after 14 days.

The K_{oc} of kresoxim-methyl in four soils was found to be 219-372, indicating moderate mobility, although degradation to 490M1 occurred during the experiment. In a separate experiment the K_{oc} of 490M1 was found to be 17 and 24 in two soils, but sorption to two other soils was too low for quantification measurement. In column leaching studies with three standard soils up to 77% of the applied dose was leached as a mixture of kresoxim-methyl and 490M1. When the study was repeated with aged soil about 60% of the AR was found in the leachate and most of this was associated with 490M1.

Leaching was examined in more realistic conditions in a lysimeter study where a crop was planted and kresoxim-methyl was applied twice at 150 g ai/ha. No kresoxim-methyl was found in the leachate during the two years of the study and the annual average concentrations of 490M1 were <0.01-0.04 μg/l.

In a study of aqueous hydrolysis half-lives assuming first-order kinetics were 875, 34 and 0.29 days at pH 5, 7 and 9.

Methods of residue analysis

Satisfactory validation data were submitted for analytical methods for a number of commodities of plant and animal origin. Determinations of kresoxim-methyl and the metabolites 490M2 and 490M9 in apples, cereal grain, straw, soil and water were usually by GLC with an ECD after extraction with a variety of solvents and clean-up by solid-phase extraction. Commodities of animal origin were analysed by HPLC with UV detection. Limits of determination were 0.01-0.05 mg/kg in plant commodities, 0.01 mg/kg in soil, 0.05 µg/l in water, 0.001-0.002 mg/kg in milk and 0.01 mg/kg in animal products.

Stability of residues stored analytical samples

Kresoxim-methyl residues in samples of wheat (immature plants, grain and straw) and apples stored at –18ºC were stable for the duration of the studies, namely up to 214 days for grain, 91 days for straw, 168 days for forage and 295 days for apples. There was no marked change in the qualitative or quantitative composition of radioactive residues in wheat samples stored frozen for 21 months, apple samples for 14 months, grape samples for 8 months or poultry samples for 21 months.

Definition of the residue

On the basis of the metabolism in apples, wheat and grapes, the Meeting agreed that the definition of the residue for compliance with MRLs for plant commodities should be kresoxim-methyl since this is the major component of the residue in primary crops. In several of the residue trials the metabolites 490M2 and 490M9 were also found but the Meeting considered these metabolites to be of low toxicity.

In ruminants the metabolite 490M9 is a major component of the residue and the parent compound is present only at very low relative concentrations. In poultry 490M9 would also be a suitable indicator compound since it was the main compound found in the liver.

The Meeting agreed to recommend the following residue definitions for both compliance with MRLs and the estimation of dietary intake.

Commodities of plant origin: *kresoxim-methyl*
Commodities of animal origin: *α-(p-hydroxy-o-tolyloxy)-o-tolyl(methoxyimino)acetic acid, expressed as kresoxim-methyl*

Supervised trials

Pome fruit. GAP for apples was reported for Austria, Belgium, Brazil, Chile, France, Germany (pome fruit), Hungary, Israel, Italy, Japan, The Netherlands, New Zealand, Norway, Poland, Slovakia, South Africa, Spain, Sweden, Switzerland, the UK and Uruguay.

Four Italian, four French and two Spanish trials were considered to comply with French and Spanish GAP (max. 0.1 kg ai/ha, PHI 35 days). The residues in all ten trials were <0.05 mg/kg. Seven German, two Belgian, six UK and two Dutch trials complied with GAP for Austria, Belgium, Hungary, Poland and the UK (also 0.1 kg ai/ha, PHI 35 days) with residues of <0.05 (11), 0.05 (3), 0.06 and 0.11 (2) mg/kg. Two New Zealand trials complied with New Zealand GAP (0.1 kg ai/ha; PHI 14 days) with residues in both of 0.04 mg/kg. Three South African trials according to South African GAP (0.01 kg ai/hl; PHI 45 days) yielded residues of 0.06, 0.09 and 0.11 mg/kg. Other trials were reported from the USA and Canada which included determinations of the metabolites 490M2 and 490M9, but no GAP was reported for the North American continent. The Meeting agreed that all

the results could be combined, as they were essentially from one population, to give residues of 0.04 (2), <0.05 (11), 0.05 (3), 0.06 (2), 0.09 and 0.11 (3) mg/kg.

GAP for pears was reported for Austria, Belgium, Chile, France, Germany, Hungary, Italy, Japan, The Netherlands, Norway, Poland, South Africa, Spain, Sweden, Switzerland and Uruguay. Separate GAP for "oriental pear" was reported for Japan.

Four Spanish trials were according to Spanish and French GAP (max. 0.1 kg ai/ha, PHI 35days) all with residues of <0.05 mg/kg. Two South African trials were reported, one of which complied with South African GAP for apples and the other with GAP for pears. The residues were 0.06 and 0.01 mg/kg respectively. The Meeting agreed that the data on pears and apples could be combined.

The combined residues in apples and pears were 0.01, 0.04 (2), <0.05 (15), 0.05 (3), 0.06 (3), 0.09 and 0.11 (3). The Meeting estimated a maximum residue level of 0.2 mg/kg and an STMR of 0.05 mg/kg for pome fruit.

Grapes. GAP was reported for Austria, Chile, Germany, Hungary, Israel, Japan, Slovakia, South Africa, Spain and Switzerland.

Seven Italian trials were according to Spanish GAP (max 0.015 kg ai/hl, PHI 35 days) with residues of <0.05 (6) and 0.15 mg/kg. Several French and German trials were reported at applications of 0.025-0.038 kg ai/hl which were higher than the German or Swiss GAP concentration of 0.0075 kg ai/hl and the Austrian concentration of 0.0125 kg ai/hl. Five French and seven German trials were considered to comply with the maximum Austrian GAP equivalent of 0.125 kg ai/ha however, with residues of 0.06, 0.09, 0.15, 0.17, 0.18, 0.20, 0.21, 0.23, 0.25, 0.36, 0.44 and 0.73 mg/kg. Three trials complied with South African GAP (0.023 kg ai/hl, PHI 14 days), with residues of 0.09, 0.14 and 0.27 mg/kg. Trials in the USA included analyses for the metabolites 490M2 and 490M9, but no GAP was reported for the North American continent. The Meeting agreed that the residues resulting from Austrian and South African GAP could be combined, since they appeared to be from the same population, to give 0.06, 0.09 (2), 0.14, 0.15, 0.17, 0.18, 0.20, 0.21, 0.23, 0.25, 0.27, 0.36, 0.44 and 0.73 mg/kg. The residues from the trials according to Spanish GAP were considered to be from a different population since six of the seven results were below the limit of determination. The Meeting estimated a maximum residue level of 1 mg/kg and an STMR of 0.2 mg/kg.

Onions. GAP for onions was reported for Nicaragua and for Welsh onions for Japan, but as trials were reported only from Germany and The Netherlands there was no basis for an evaluation.

Cucumbers. GAP was reported for Brazil, Japan, Spain and Norway.

The residues in eight Spanish indoor trials which complied with Spanish GAP (0.01-0.015 kg ai/hl; PHI 3 days) were all <0.05 mg/kg, and in seven of the trials <0.05 mg/kg even on the day of application. The Meeting estimated a maximum residue level of 0.05* mg/kg and an STMR of 0.05 mg/kg.

Melons. No GAP was reported.

Tomatoes, sweet peppers. Eight indoor trials in Spain on each commodity complied with Spanish glasshouse GAP (max. 0.025 kg ai/hl; PHI 3 days), with residues of 0.09, 0.13, 0.14, 0.20, 0.23, 0.25, 0.27 and 0.31 mg/kg in tomatoes, and 0.10 (2), 0.15, 0.19, 0.21, 0.37, 0.39 and 0.44 mg/kg in peppers. As none of the trials were identified as complying with GAP until late in the Meeting however, neither maximum residue levels nor STMRs were estimated.

Wheat. GAP for wheat was reported for Belgium, Ireland, Luxembourg, The Netherlands, Poland, Slovakia and the UK, and for cereals for Germany and Japan.

The residues in winter and spring wheat were evaluated together because the levels were similar and the latest time of application was described as a pre-harvest interval not a growth stage. Seven German, three Belgian and five French trials accorded with Belgian, Polish, German, Dutch and Luxembourg GAP (0.105-0.150 kg ai/ha, PHI 35 days) with residues all <0.05 mg/kg in the grain or ears and <0.05, 0.05, 0.08, 0.09, 0.12, 0.13, 0.18, 0.19, 0.26, 0.28, 0.50, 1.27, 1.45, 2.59 and 4.00 mg/kg in the straw or haulm. Residues of the metabolites 490M9 and 490M2 were also measured and the total residue calculated. The Meeting estimated maximum residue levels of 0.05* and 5 mg/kg and STMRs of 0.05 and 0.19 mg/kg for the grain and straw respectively.

Barley. GAP for barley was reported for Belgium, France, Germany, Luxembourg, Norway, Switzerland, Ireland, The Netherlands, Poland and the UK, and for cereals for Germany and Japan.

The trials on winter and spring barley were evaluated together for the reasons given above. Three Dutch, two French and six German trials complied with GAP in Belgium, France, Germany, Luxembourg, The Netherlands, Norway and Poland (max. rate 0.105 or 0.125 kg ai/ha, PHI 35 or 42 days) with residues of <0.05 (9) and 0.06 (2) mg/kg in the grain or ears and 0.07, 0.08, 0.14 0.20, 0.22, 0.26, 0.28, 0.45, 0.79 and 0.92 mg/kg in the straw or haulm. The Meeting estimated maximum residue levels of 0.1 and 2 mg/kg and STMRs of 0.05 and 0.24 mg/kg for grain and straw respectively.

Rye. GAP was reported for Belgium, France, Germany, Luxembourg, Poland, Switzerland and The Netherlands, with maximum application rates of 0.105 or 0.125 kg ai/ha and PHIs of 35 days.

Only two trials were reported, both in Germany and according to GAP, with residues of <0.05 mg/kg in the ears and 0.08 and 0.11 mg/kg in the haulms. The Meeting agreed that the data for wheat could be extrapolated to rye, giving combined residues of <0.05 (17) mg/kg in the grain and <0.05, 0.05, 0.08 (2), 0.09, 0.11, 0.12, 0.13, 0.18, 0.19, 0.26, 0.28, 0.50, 1.27, 1.45, 2.59 and 4.00 mg/kg in the straw or haulm. The Meeting estimated maximum residue levels of 0.05* and 5 mg/kg, and STMRs of 0.05 and 0.18 mg/kg for grain and straw respectively.

The Meeting agreed that it was appropriate to recommend a group MRL for cereal straws rather than separate MRLs for the individual straws. Accordingly the Meeting recommended an MRL of 5 mg/kg and estimated an STMR of 0.24 mg/kg for “straw and fodder (dry) of cereal grains” since these represented the highest estimates for any individual cereal.

Pecans. A number of trials in the USA were reported but the Meeting was informed that there was no current GAP for pecans.

Processing studies

Apples were processed to washed fruit, apple juice, wet pomace and apple sauce, and grapes to juice, must, wine, wet pomace, and raisins. The mean processing factors were <0.4, <1 and <0.4 for apple juice, wet apple pomace and apple sauce, and 0.1, 0.7, <0.2 and 1.6 for must, wet grape pomace, wine and raisins respectively.

From these factors the Meeting estimated a maximum residue level of 2 mg/kg for dried grapes and STMRs of 0.05, 0.02 and 0.02 mg/kg for wet apple pomace, apple sauce and apple juice and 0.14, 0.02, 0.04 and 0.32 mg/kg for wet grape pomace, grape must, wine and dried grapes respectively. A study of the effects of brewing on residues in barley was difficult to interpret since

the residues were <0.05 mg/kg in the initial grain although the barley had been treated at twice the GAP rate.

Farm animal feeding studies

Dairy cows were dosed twice daily with kresoxim-methyl at rates equivalent to 6, 18 and 60 ppm in the feed for 28 or 29 days. Residues of 490M2 and 490M9 in whole milk, cream and skimmed milk were <0.002 mg/kg; 490M1 was not determined. Residues in the tissues of the low-dose group were all <0.01 mg/kg, except those of 490M1 which appeared in the kidneys at 0.021-0.028 mg/kg. In the high-dose group the highest residue concentrations were 490M1 in the kidneys (<0.01-0.29 mg/kg) and peritoneal fat (<0.01-0.091 mg/kg), and 490M9 in the liver (<0.01-0.024 mg/kg) and kidneys (<0.01-0.049 mg/kg).

The highest residue levels in the feed items were in wheat straw for which the Meeting estimated a maximum residue level of 5 mg/kg. This leads to a theoretical maximum dietary level of 2.5 ppm, based on a 50% level of straw in the diet. The Meeting concluded that no residues above the practical limits of determination (0.01 mg/kg for milk and 0.05 mg/kg for other animal products) would occur in animal commodities from this dietary level. The Meeting estimated maximum residue levels of 0.01* mg/kg for milks and 0.05* mg/kg for mammalian meat, edible offal and fats, and corresponding STMRs of 0.002 and 0.01 mg/kg. The STMRs are based on the validated limits of determination of the analytical methods for these commodities.

The only poultry feed item containing determinable residues was barley grain with residues in the trials of ≤0.06 mg/kg and an estimated maximum residue level of 0.1 mg/kg. The Meeting concluded that the intake for poultry would be ≤0.1ppm in the feed. In the poultry metabolism study TRRs were very low in the skin (0.009 mg/kg), kidneys (0.065 mg/kg) and liver (0.082 mg/kg) at doses equivalent to 10 ppm in the feed. The Meeting concluded that no residues above the practical limit of determination (0.05 mg/kg) would occur in edible poultry tissues, and estimated a maximum residue level of 0.05* mg/kg and an STMR of 0.01 mg/kg for poultry meat. The STMR is based on the validated limit of determination for the reported methods of analysis.

RECOMMENDATIONS

On the basis of data from supervised trials the Meeting estimated the maximum residue levels and STMRs listed below. The maximum residue levels are recommended for use as MRLs.

Definition of the residue for compliance with MRLs and for the estimation dietary intake for plant commodities: kresoxim-methyl.

For compliance with MRLs and for the estimation dietary intake for animal commodities: α-(*p*-hydroxy-*o*-tolyloxy)-*o*-tolyl(methoxyimino)acetic acid, expressed as kresoxim-methyl

Commodity		Recommended MRL, mg/kg		STMR
CCN	Name	New	Previous	
JF 0226	Apple juice			0.02
	Apple pomace, wet			0.05
JF 0226	Apple sauce			0.02
GC 0640	Barley	0.1		0.05
VC 0424	Cucumber	0.05*		0.05
DF 0269	Dried grapes (= currants, raisins and sultanas)	2		0.32
MO 0105	Edible offal (Mammalian)	0.05*		0.01
	Grape must			0.02

Commodity		Recommended MRL, mg/kg		STMR
CCN	Name	New	Previous	
	Grape pomace, wet			0.14
FB 0269	Grapes	1		0.2
MF 0100	Mammalian fats (except milk fats)	0.05*		0.01
MM 0095	Meat (from mammals other than marine mammals)	0.05*		0.01
ML 0106	Milks	0.01*		0.002
FP 0009	Pome fruits	0.2		0.05
PM 0110	Poultry meat	0.05*		0.01
GC 0650	Rye	0.05*		0.05
AS 0081	Straw and fodder (dry) of cereal grains	5		0.24
GC 0654	Wheat	0.05*		0.05
	Wine			0.04

FURTHER WORK OR INFORMATION

Desirable

1. Information on residues in food in commerce or at consumption (monitoring or total diet data).

2. Experimental determination of whether (*E*)-methoxyimino[∀-(*o*-tolyloxy)-*o*-tolyl]acetic acid (490M1) is methylated to kresoxim-methyl when methanol is used as an extractant in metabolism studies or the analysis of samples from supervised trials.

DIETARY RISK ASSESSMENT

STMRs have been estimated for 18 commodities of which the 11 commodities for which there are consumption data have been used in the estimate of dietary intake.

The International Estimated Dietary intakes for the five GEMS/Food regional diets were 0% of the ADI. The Meeting concluded that the intake of residues of kresoxim-methyl resulting from its uses that have been considered by the JMPR is unlikely to present a public health concern.

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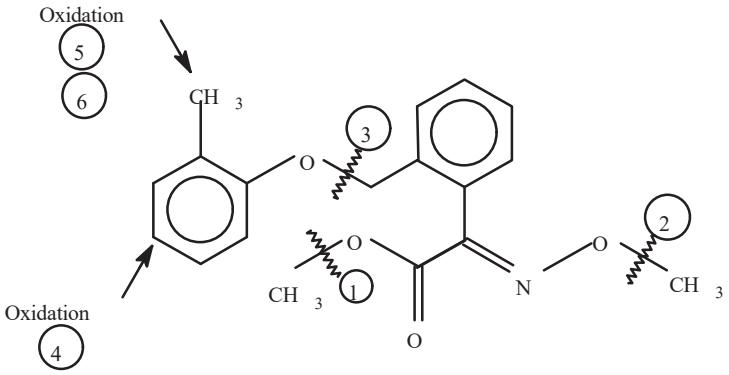
KRESOXIM-METHYL FIGURES 1-13

Figure 1. Metabolic reactions of kresoxim-methyl in rats.



1. Ester cleavage
2. Oxime ether cleavage
3. Benzyl ether cleavage
4. Oxidation on the phenoxy ring
5. Oxidation of methyl group on the phenoxy ring
6. Subsequent oxidation to the carboxylic acid

Figure 2. Metabolic pathways of kresoxim-methyl in goats.

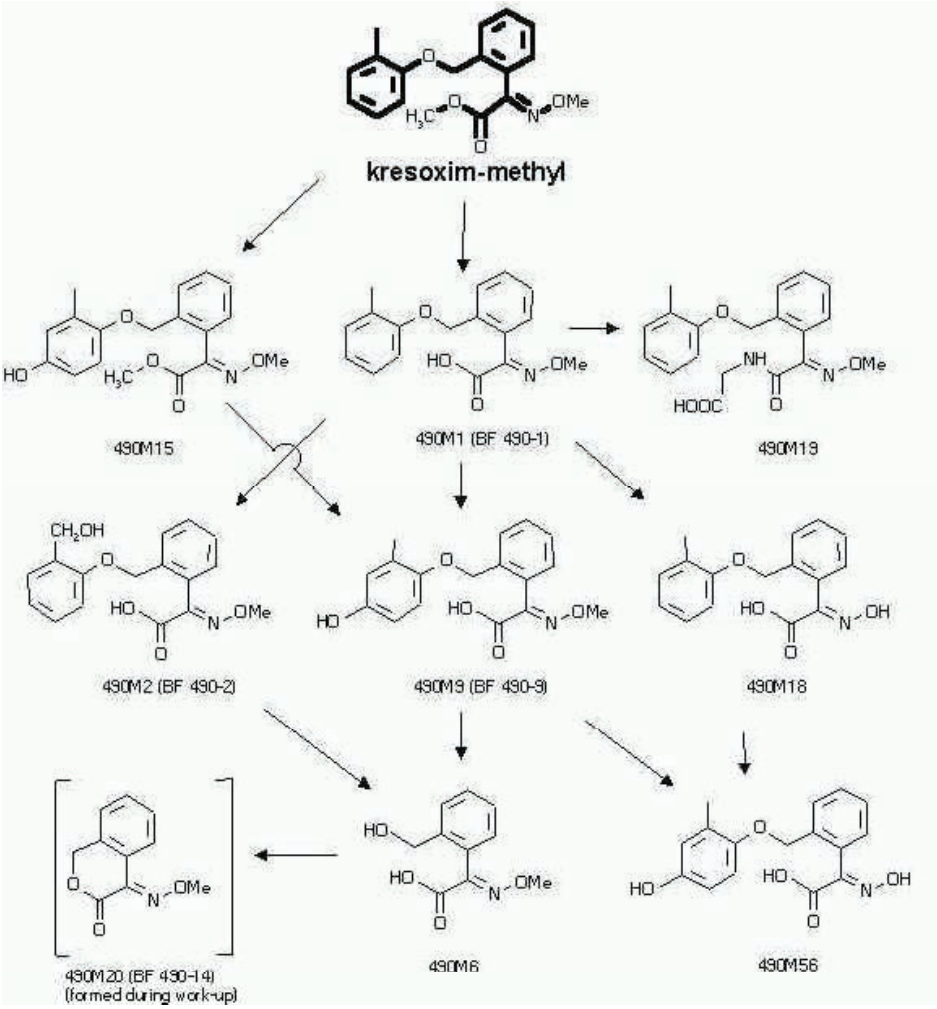


Figure 3. Metabolic pathways of kresoxim-methyl in poultry.

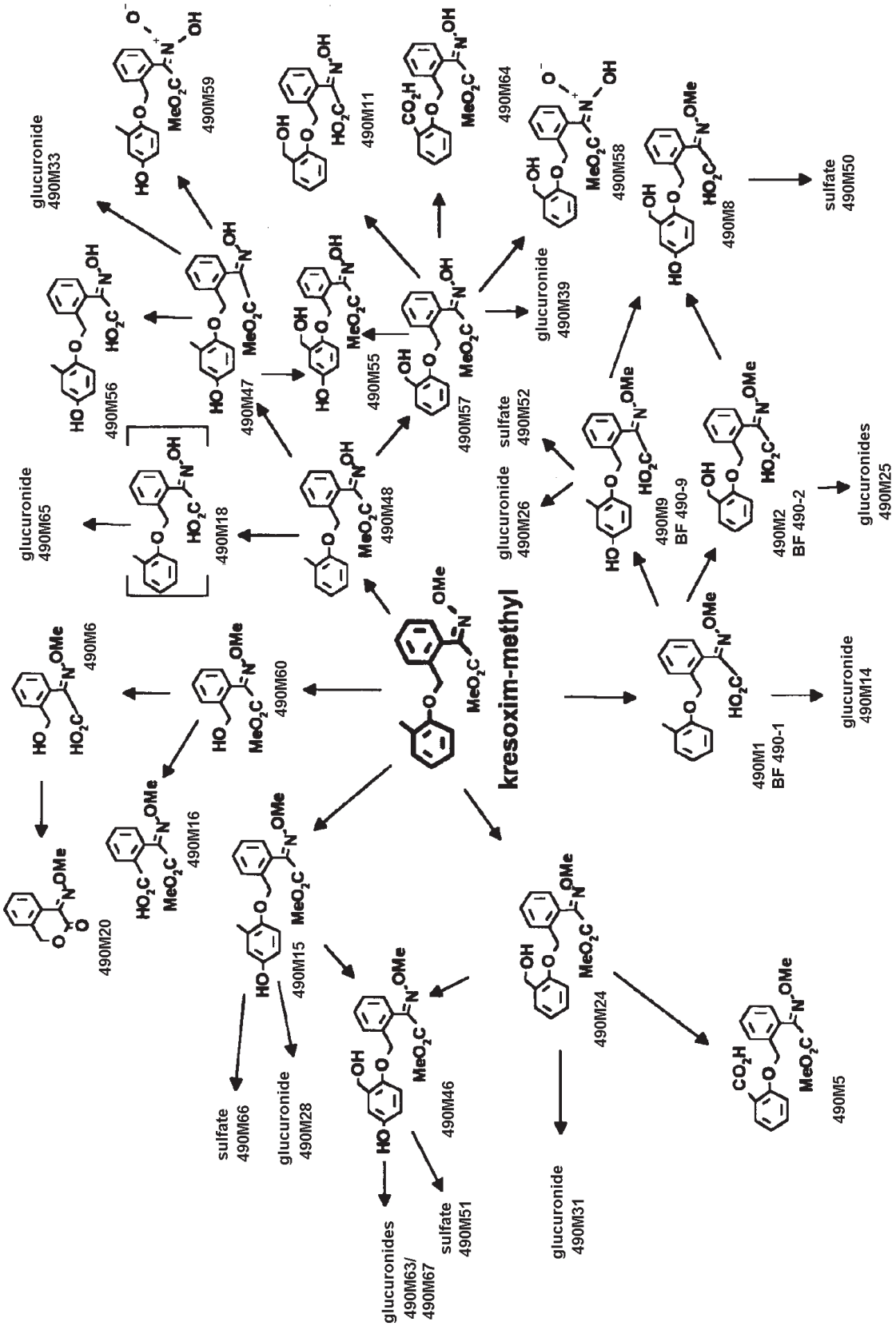


Figure 4. Extraction and characterization of apple peel samples.

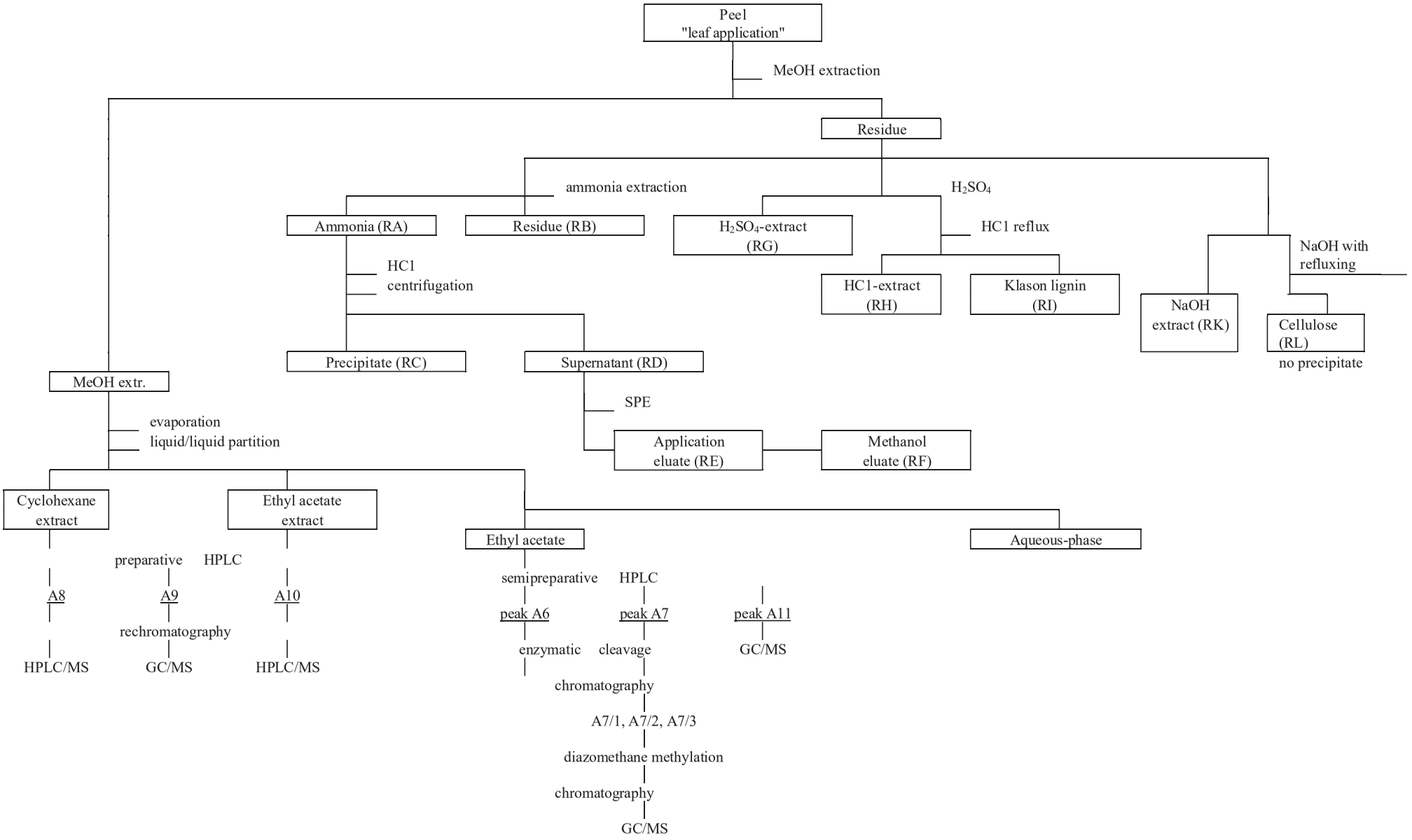


Figure 5. Extraction and characterization of apple pulp samples.

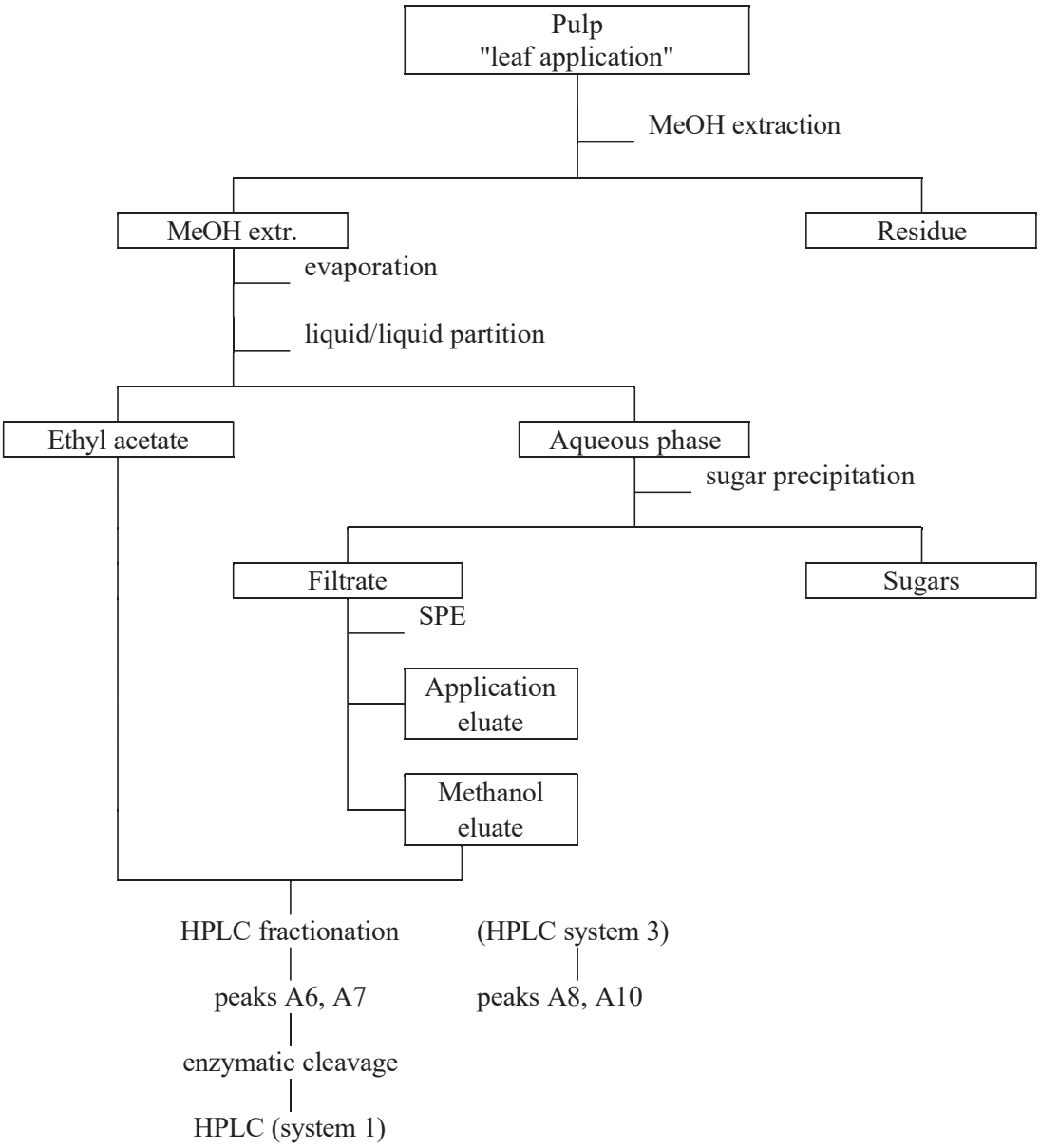
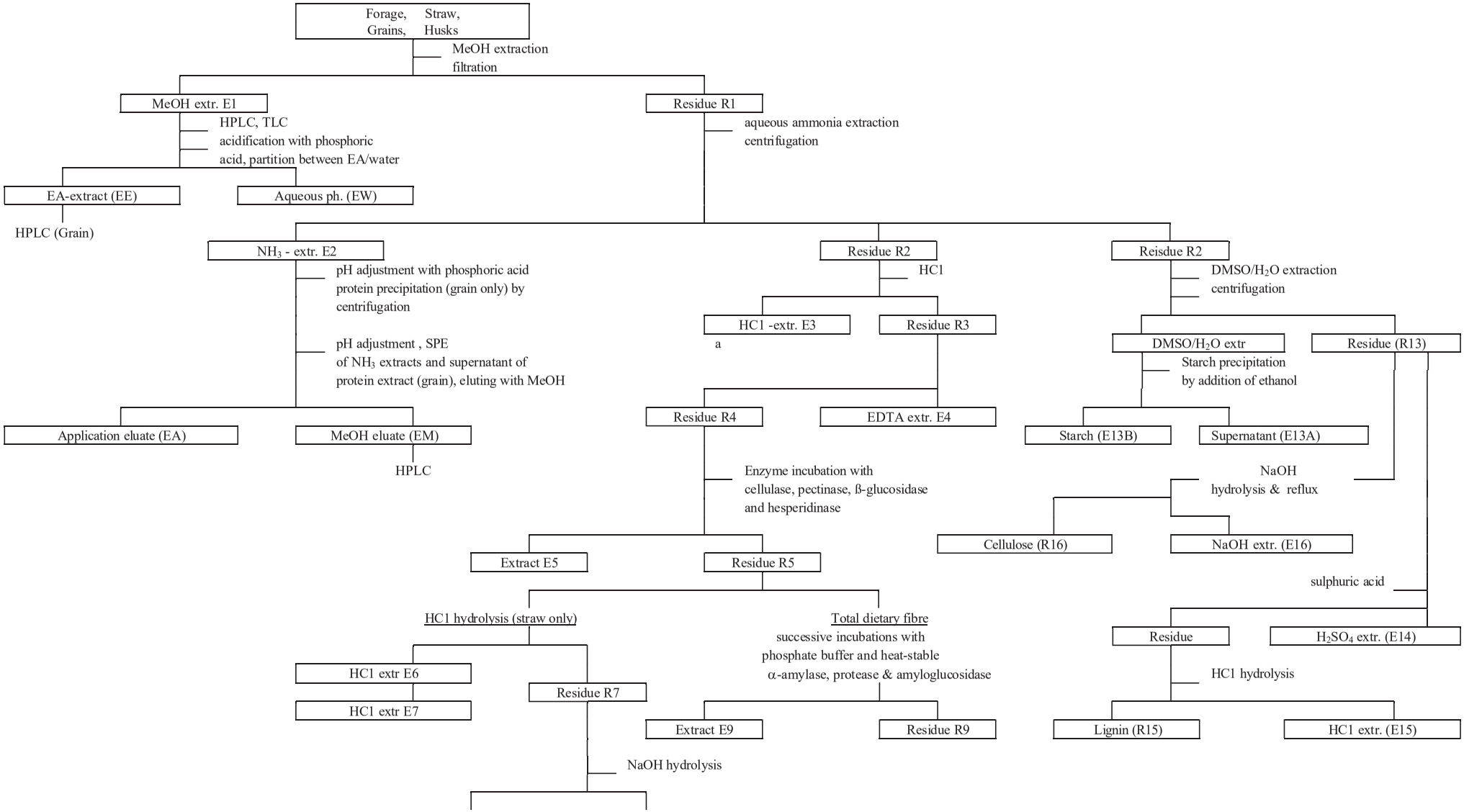


Figure 6. Extraction and characterization of radioactive residues in wheat forage, straw and grain.



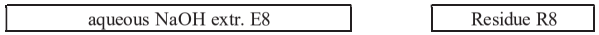
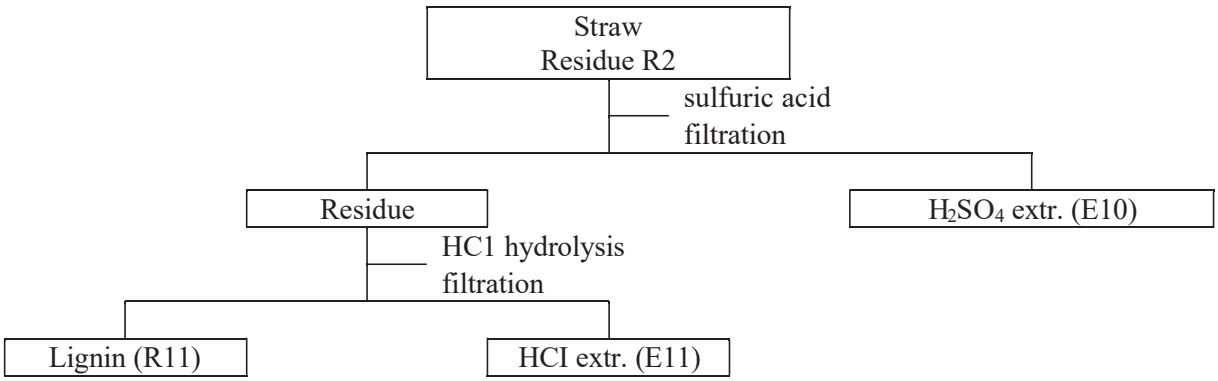

aqueous NaOH extr. E8
Residue R8

Figure 7. Characterization of unextractable residues in wheat straw.

A) Klason Lignin



B) Cellulose fractionation

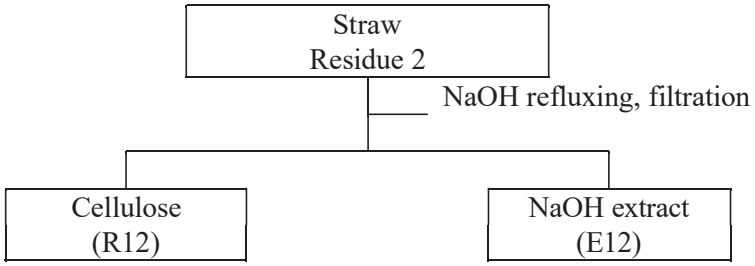
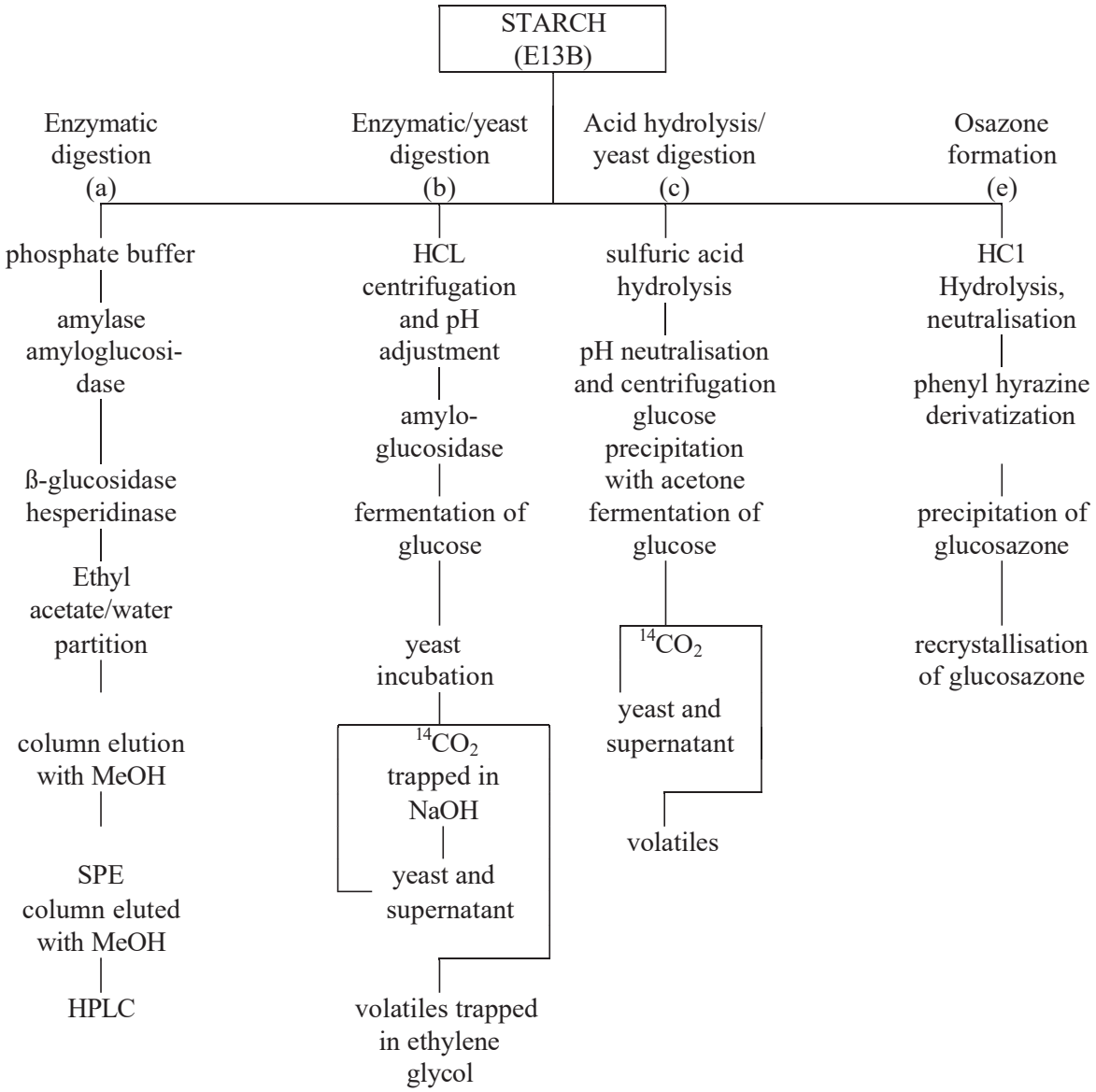


Figure 8. Fractionation of wheat starch.



(d): as trial (c), but with commercially available ^{14}C glucose

Figure 9. Extraction and characterization of ^{14}C residues in grapes.

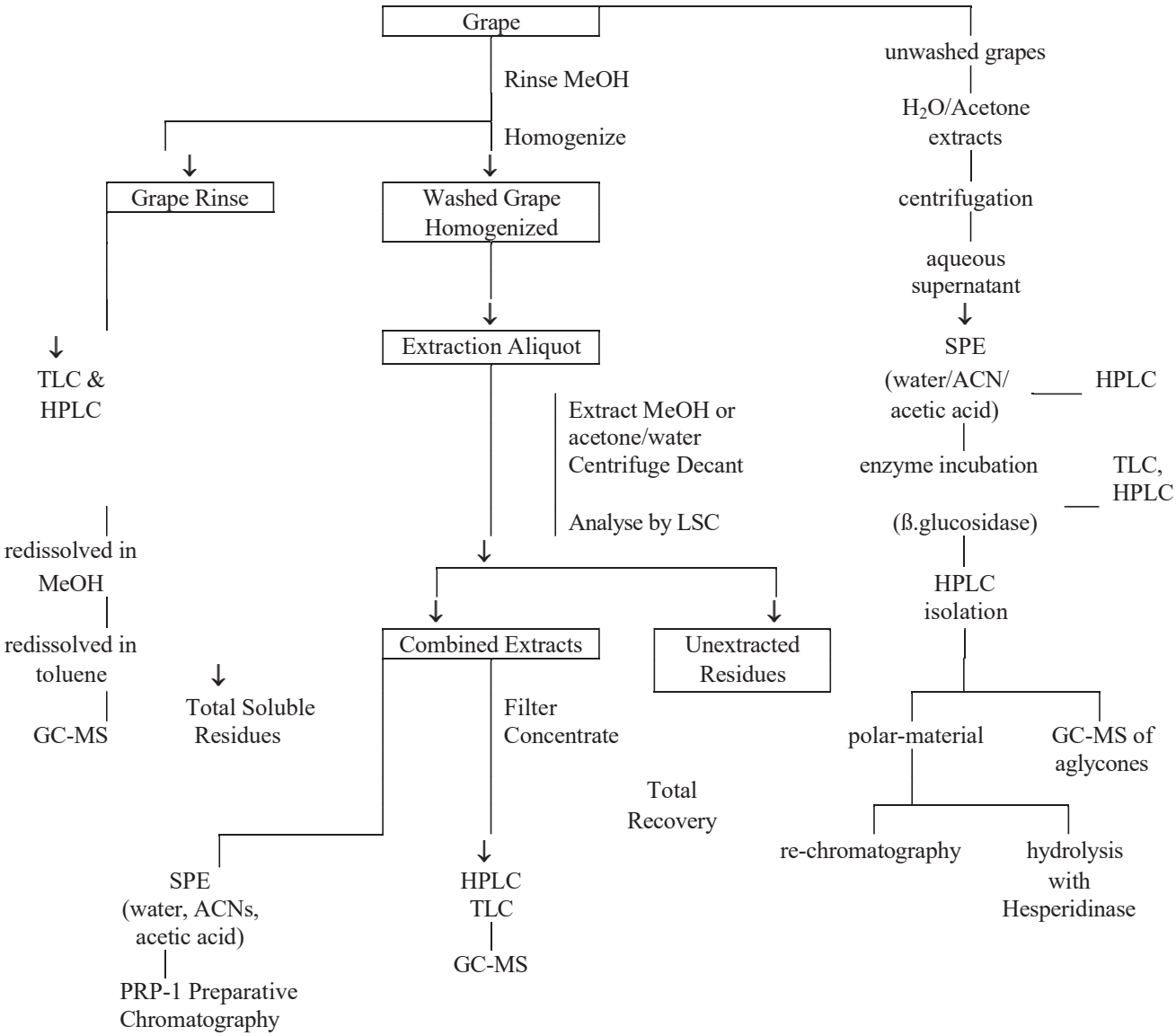


Figure 10. Metabolic pathways of kresoxim-methyl in apples, wheat and following crops

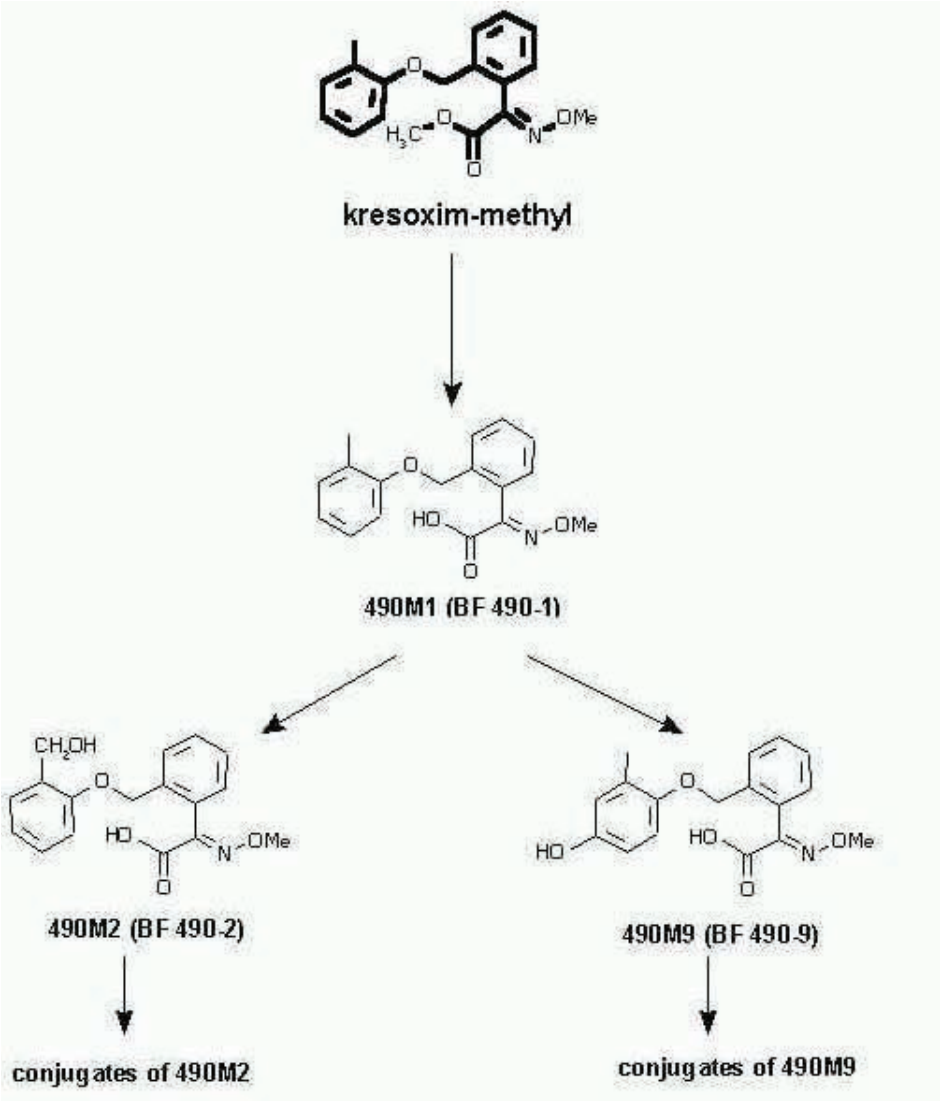


Figure 11. Metabolic pathways of kresoxim-methyl in grapes.

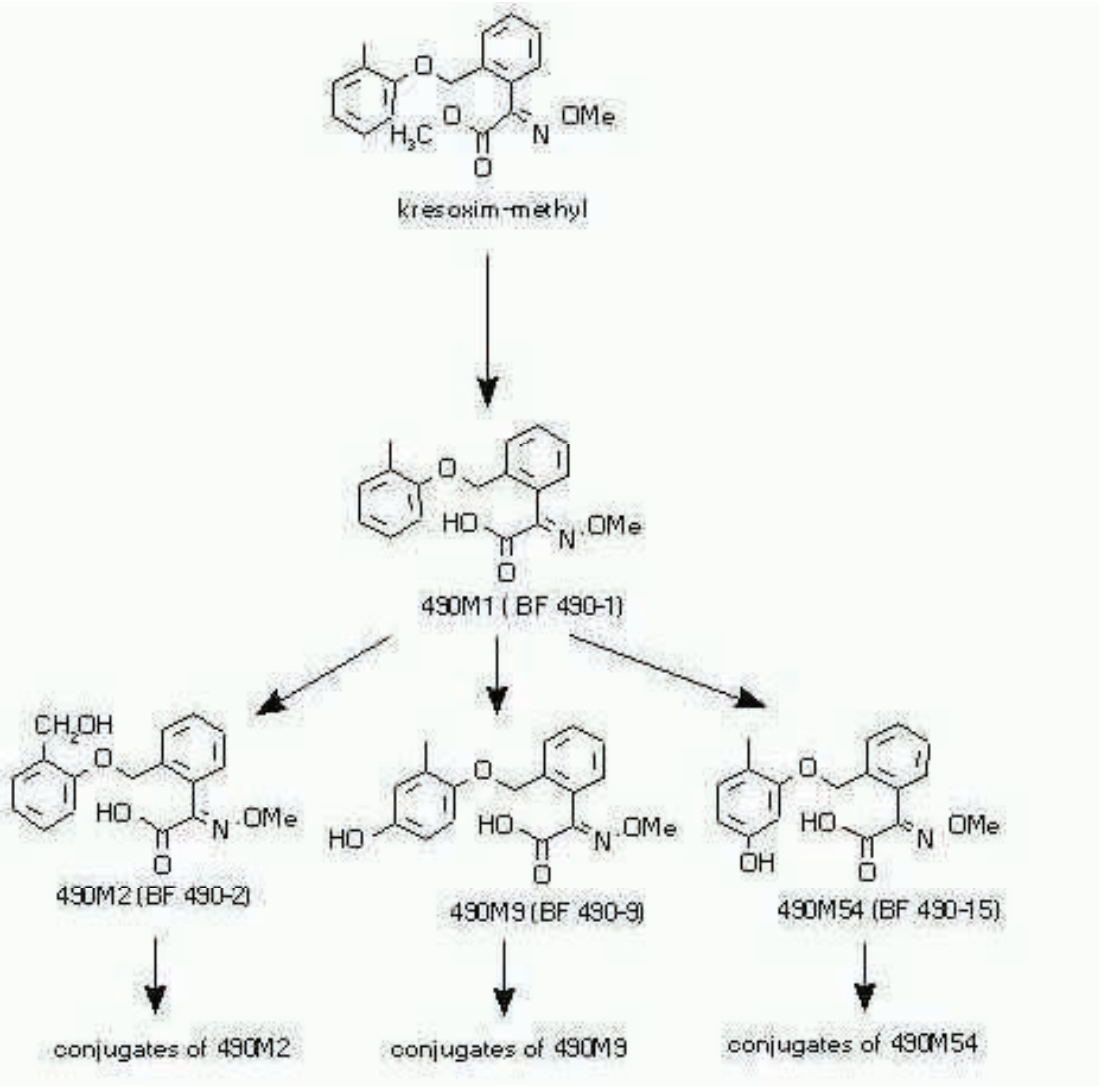
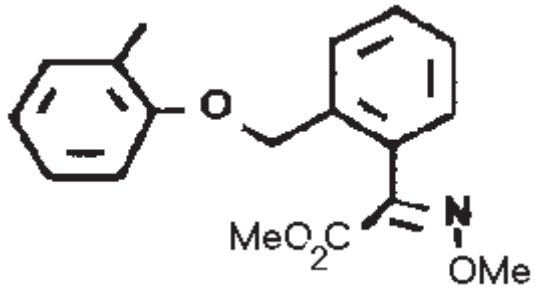
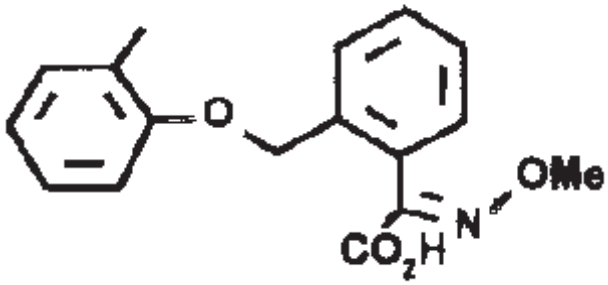
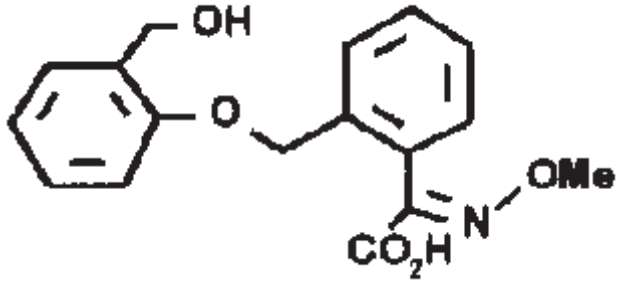
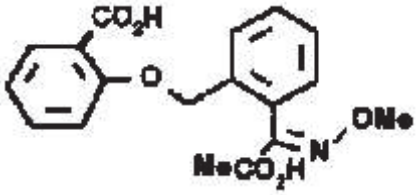
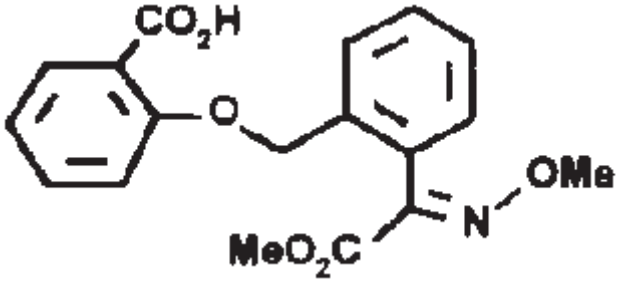
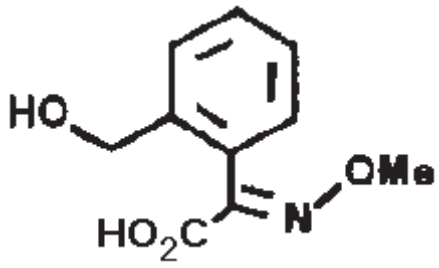
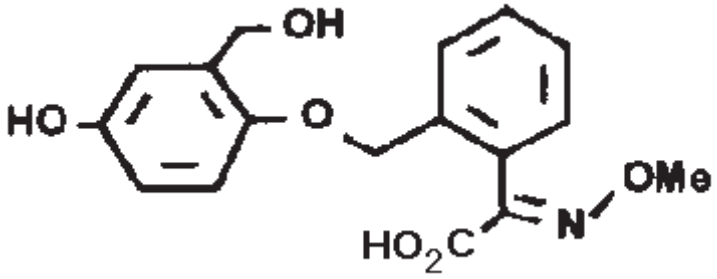
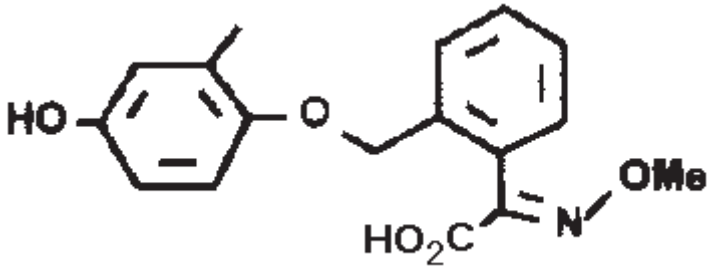
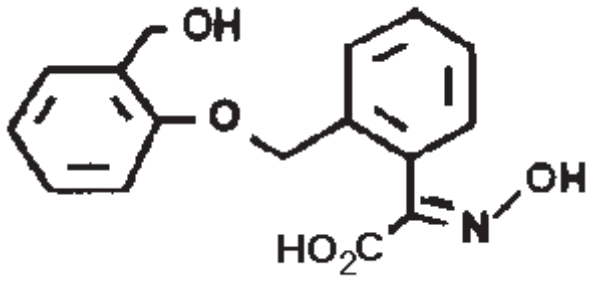
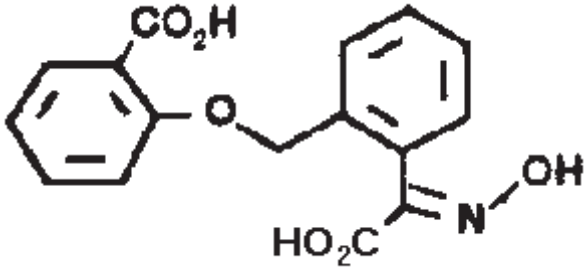
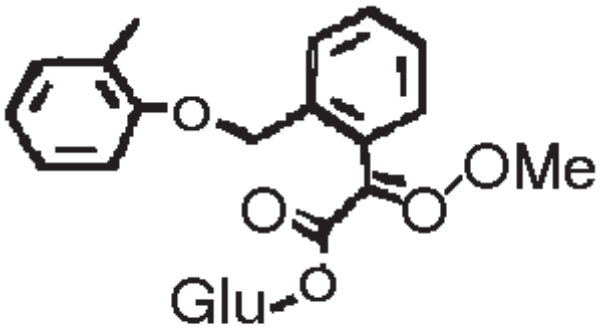
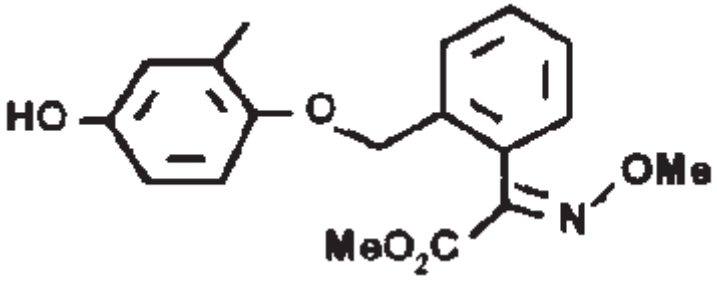
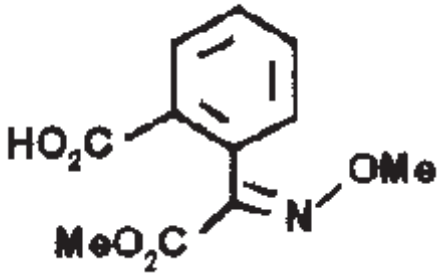
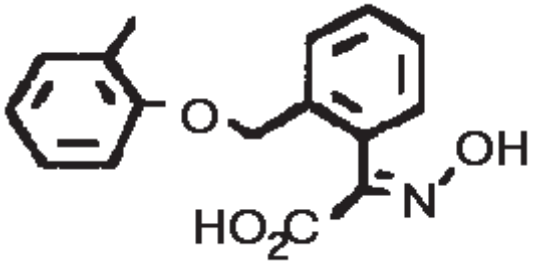
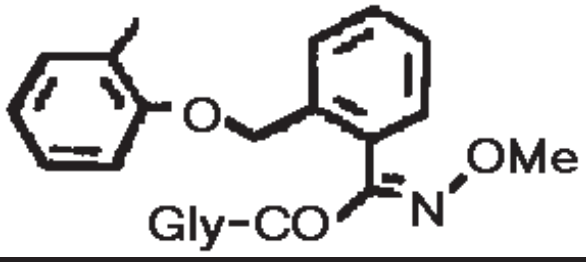
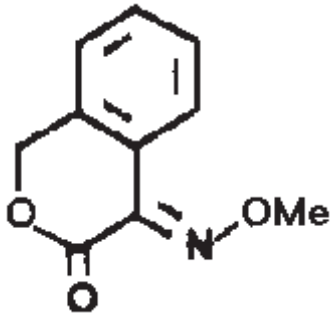
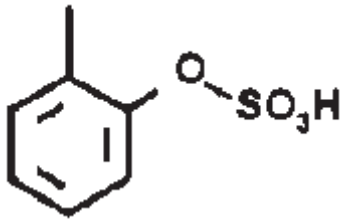
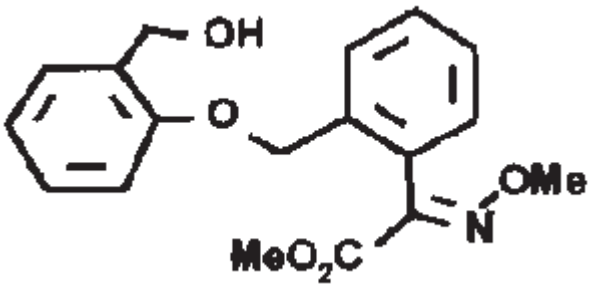
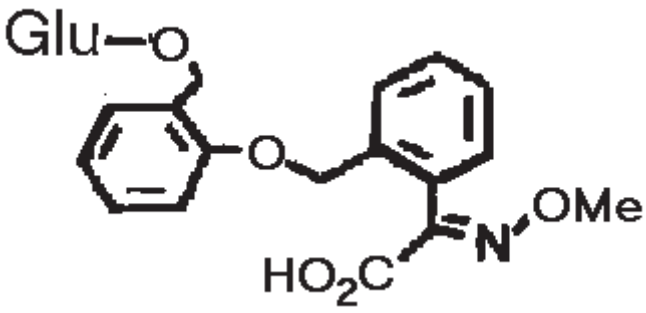
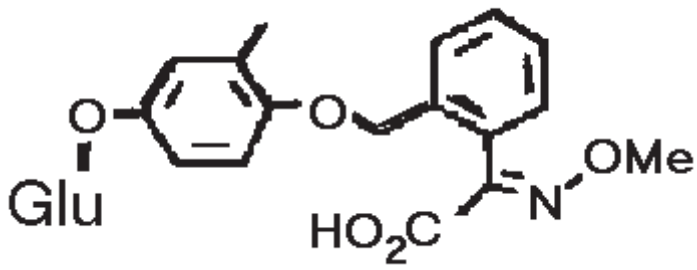


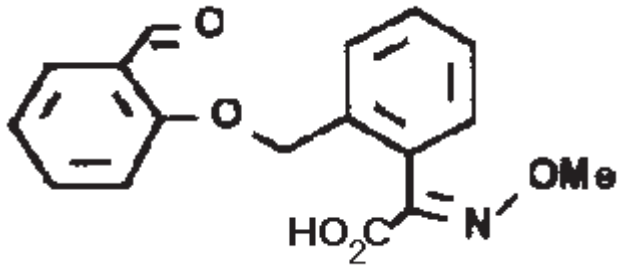
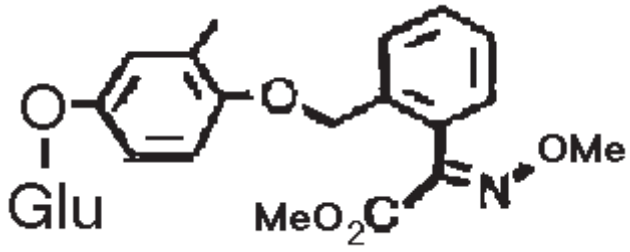
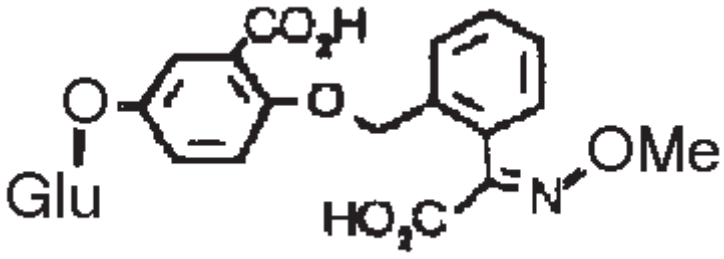
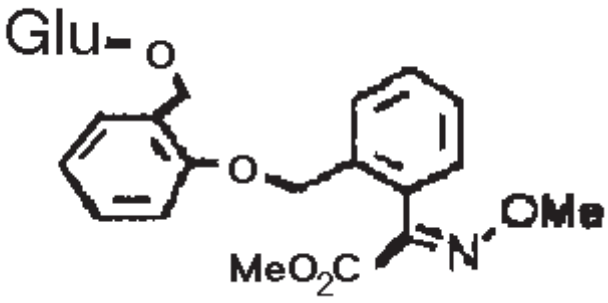
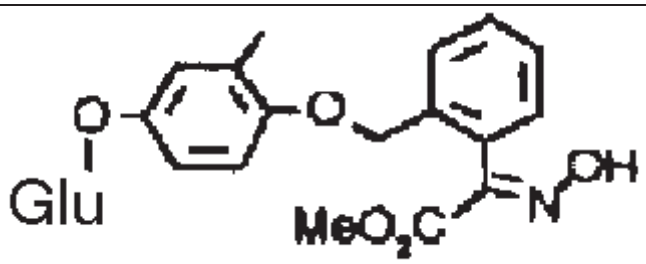
Figure 12. Code names and structures of degradation products and metabolites of kresoxim-methyl.

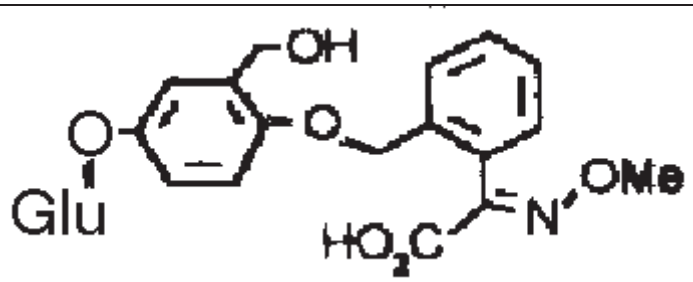
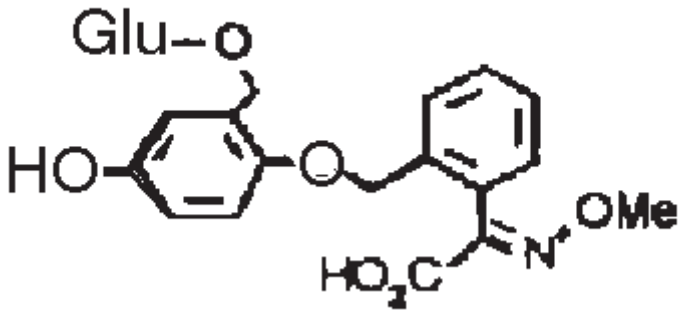
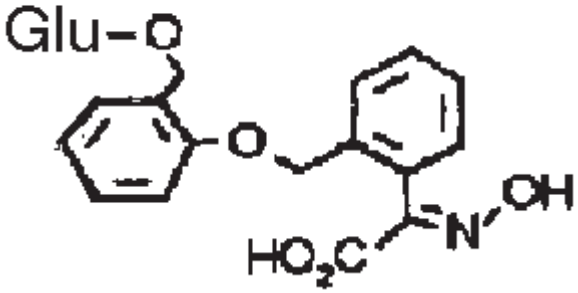
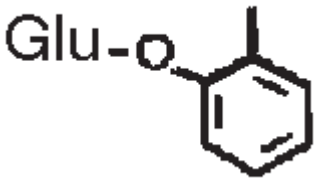
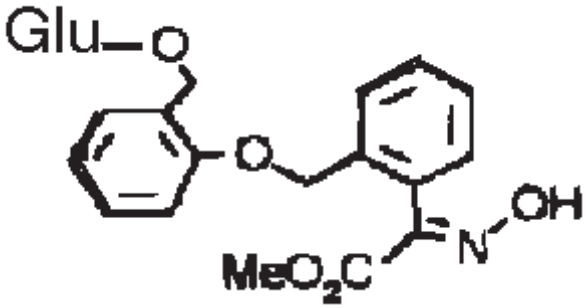
Code	Structure	Occurrence
490M0 (*Z*)-Isomer (242010)		Rat
490M1 BF 490-1 (262451)		Rat Goat Hen Apple Wheat Soil Water
490M2 BF 490-2 (291685)		Rat Goat Apple Wheat Grape
490M4 BF 490-5 (286404)		Rat Soil
490M5		Rat Hen

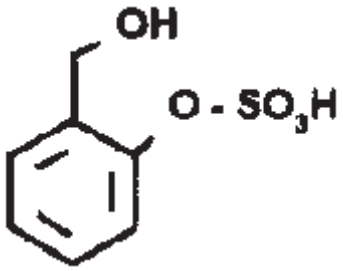
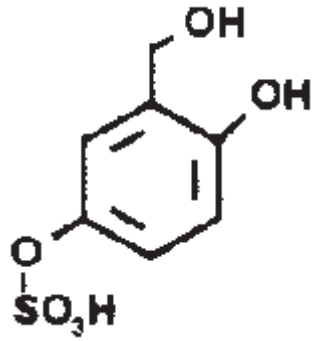
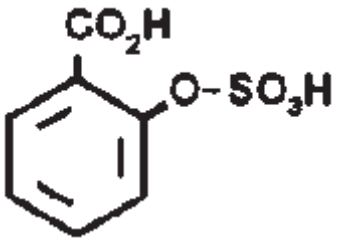
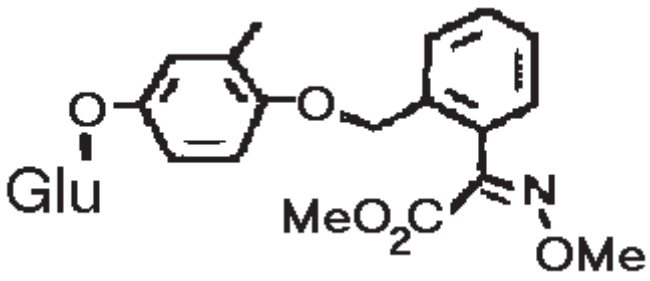
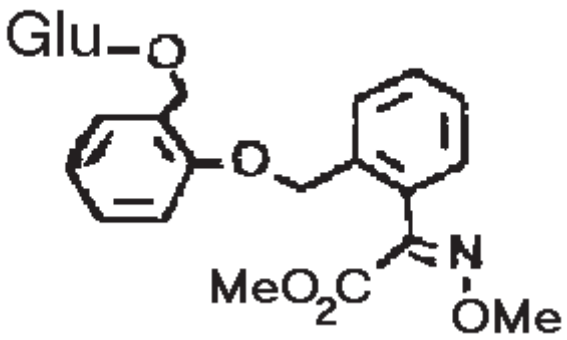
Code	Structure	Occurrence
490M6		Rat Goat Hen
490M8 BF 490-11 (303218)		Rat Hen
490M9 BF 490-9 (292932)		Rat Goat Hen Apple Wheat Grape
490M11		Rat Hen
490M12		Rat

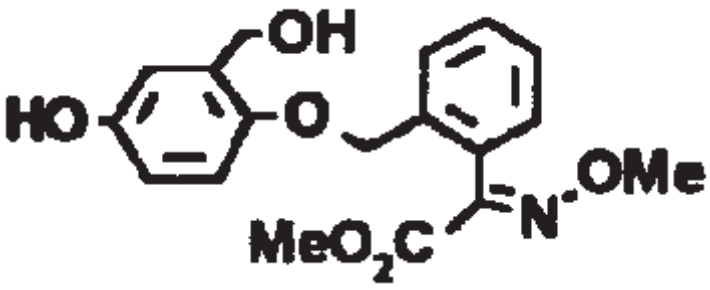
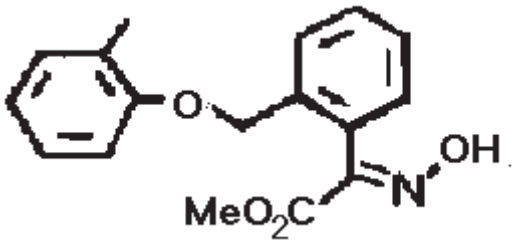
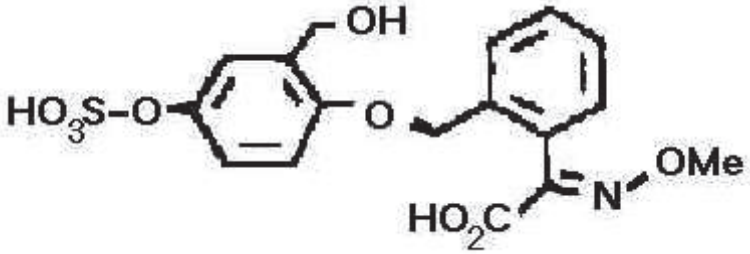
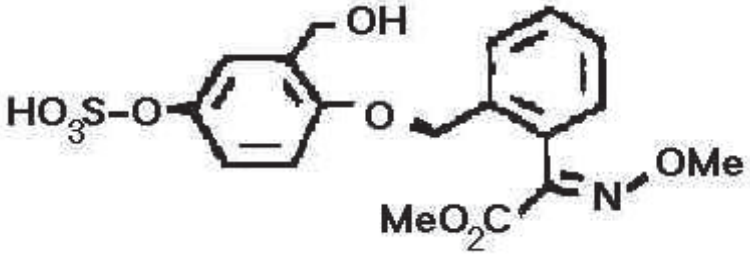
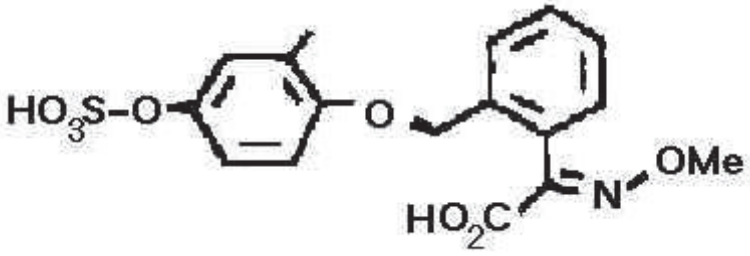
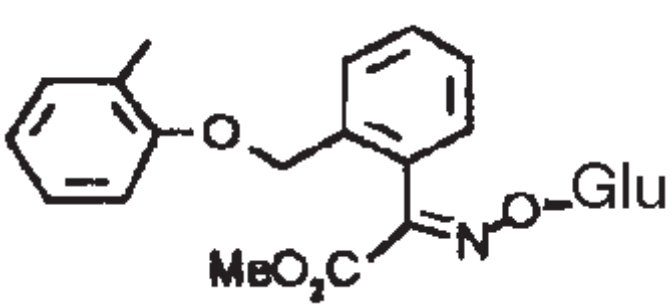
Code	Structure	Occurrence
490M14		Rat Hen
490M15 BF 490-4 (299446)		Rat Goat Hen
490M16		Rat Hen
490M18 BF 490-8 (299153)		Goat
490M19		Goat

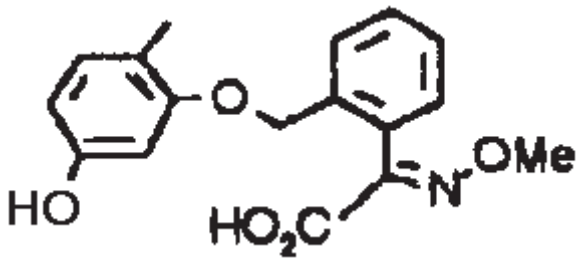
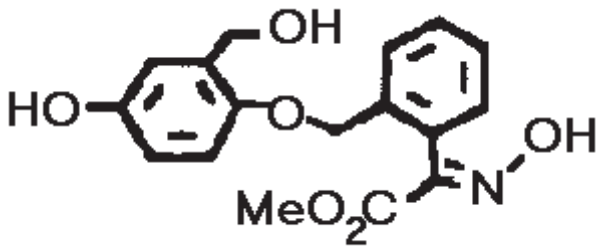
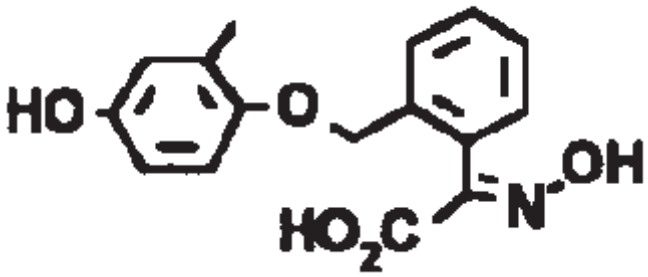
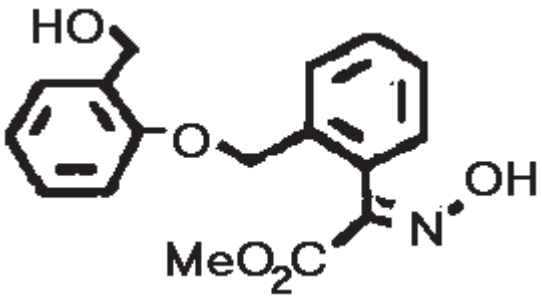
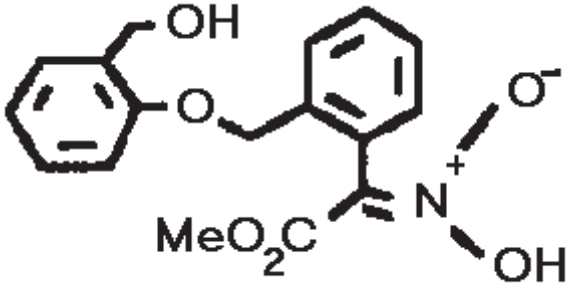
Code	Structure	Occurrence
490M20 BF 490-14		Rat Hen
490M22		Rat
490M24		Rat Hen
490M25		Rat Hen
490M26		Rat Hen

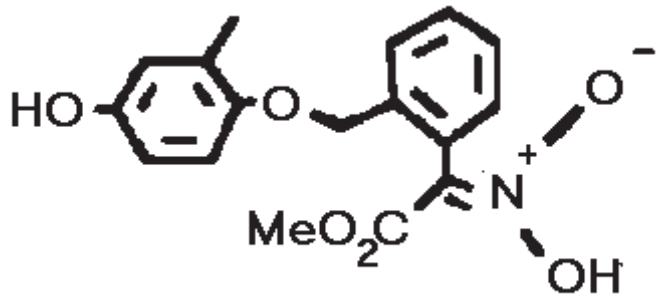
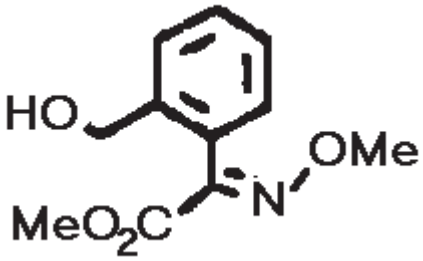
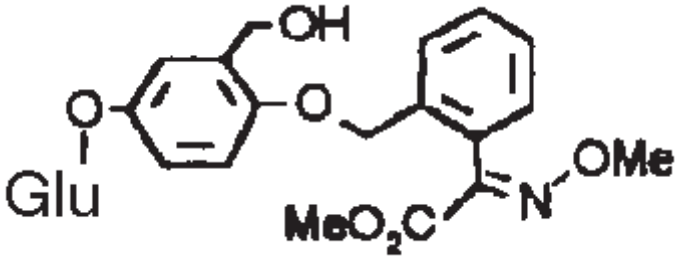
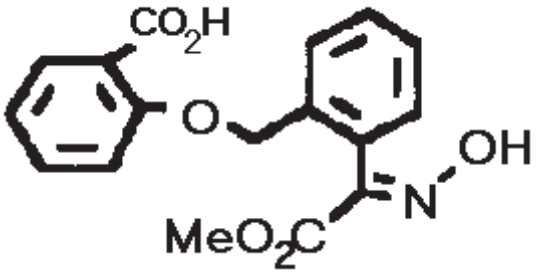
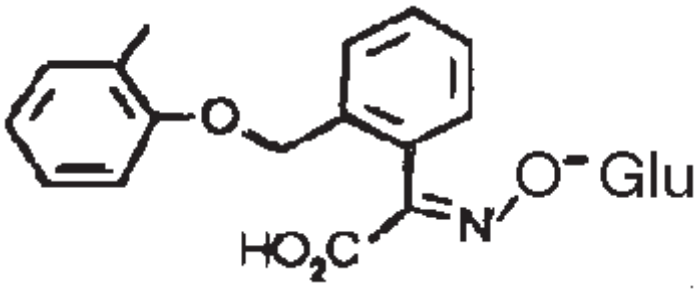
Code	Structure	Occurrence
490M27		Rat
490M28		Rat Hen
490M29		Rat
490M31		Rat Hen
490M33		Rat Hen

Code	Structure	Occurrence
490M34		Rat
490M35		Rat
490M36		Rat
490M37		Rat
490M39		Rat Hen

Code	Structure	Occurrence
490M41		Rat
490M42		Rat
490M43		Rat
490M44		Rat
490M45		Rat

Code	Structure	Occurrence
490M46		Hen
490M48 BF 490-3 (266042)		Hen
490M50		Hen
490M51		Hen
490M52		Hen
490M53		Rat

Code	Structure	Occurrence
490M54 BF 490-15		Grape
490M55		Hen
490M56		Goat Hen
490M57		Hen
490M58		Hen

Code	Structure	Occurrence
490M59		Hen
490M60		Hen
490M63		Hen
490M64		Hen
490M65		Hen

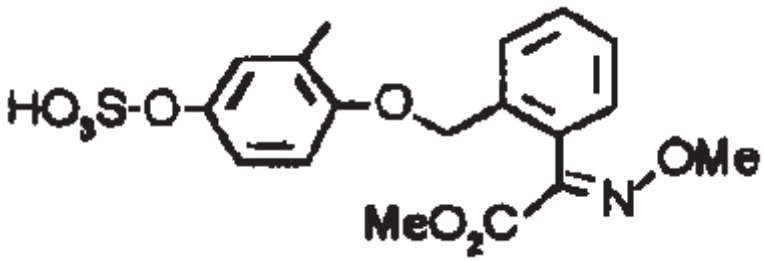
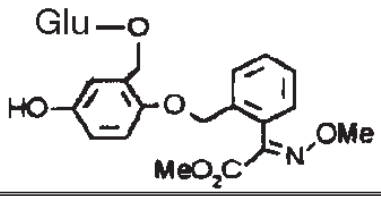
Code	Structure	Occurrence
490M66		Hen
490M67		Hen

Figure 13. Proposed degradation pathway of kresoxim-methyl in soil.