INDOXACARB (216)

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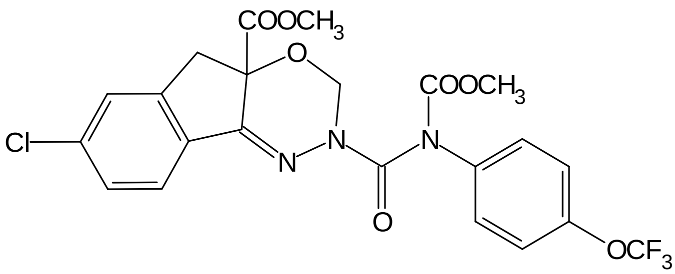
EXPLANATION

Indoxacarb is an indeno-oxadiazine insecticide that is used for control of lepidoptera and other pests. Indoxacarb is a new pesticide in the Codex System. The CCPR, in 2002 (34th Session), requested an evaluation by the present meeting of JMPR. The manufacturer submitted studies on metabolism, supervised field trials, processing, farm animal feeding, analytical methods and freezer storage stability.

IDENTITY

ISO common name	Indoxacarb
Synonyms:	DPX-KN128 S-enantiomer, i.e. indoxacarb IN-KN127 is R-enantiomer of indoxacarb DPX-MP062 is 3 parts indoxacarb + 1 part IN-KN127
IUPAC name	(S)-7-chloro-3-[methoxycarbonyl-(4-trifluoromethoxy-phenyl)-carbamoyl]-2,5-dihydro-indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylic acid methyl ester
Chemical Abstracts name	(S)-methyl 7-chloro-2,5-dihydro-2-[[(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylate
CAS Number	indoxacarb: 173584-44-6 DPX-MP062: 144171-61-9
CIPAC Number	612
Molecular formula	$C_{22}H_{17}ClF_3N_3O_7$
Molecular mass	527.84 g/mol
Structural formula	

Physical and Chemical Properties

Pure active ingredient.

		Ref
Appearance	white powder	AMR 4141-96
Odour	mild innocuous odour	AMR 4141-96
Melting point	88.1 ± 0.4°C	AMR 4141-96
Relative density	1.44 ± 0.065	AMR 4141-96
Vapour pressure	9.8×10^{-9} Pa at 20°C 2.5×10^{-8} Pa at 25°C	AMR 4169-96
Henry's Law constant	6×10^{-5} Pa.m^3 mol^{-1} at 25°C	AMR 4169-96
Solubility in water	20 ± 2 µg/l at 25°C	AMR 4141-96

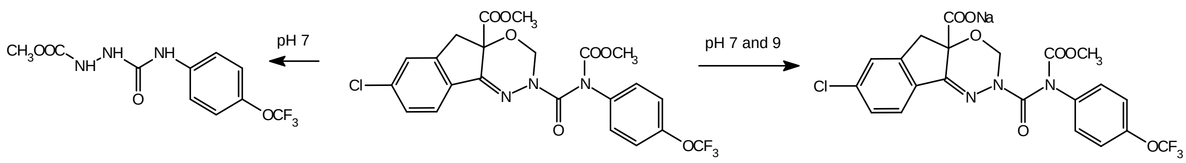
			Ref
Solubility in organic solvents at 20°C:	acetonitrile	> 250 g/L	DuPont-12940
	dimethylformamide	> 250 g/L	
	ethyl acetate	> 250 g/L	
	n-hexane	1.31 g/L	
	methanol	109.9 g/L	
	methylene chloride	> 250 g/L	
	n-octanol	11.31 g/L	
	o-xylene	> 250 g/L	
Dissociation constant in water	no pK_a observed in pH range 2.42-11.36		AMR 4141-96
Octanol/water partition coefficient:	$\log K_{ow}$ = 4.65 at 25°C		AMR 4141-96

<u>Technical material</u> *DPX-MP062 (3 parts indoxacarb + 1 part IN-KN127, R-enantiomer of indoxacarb)*

Hydrolysis (sterile soln) at 25°C See below.	pH 5 buffer	stable	DuPont-9800
	pH 7 buffer	DT_{50} 22 days	
	pH 9 buffer	DT_{50} 0.3 days	
Photolysis in water at 25°C	Half-life 3 days at pH 5 (experiment days, i.e. full-time exposure)		DuPont-9801

Hydrolysis of indoxacarb technical (Lentz, 2002a)

Two hydrolysis products were identified at more than 10% of starting material.

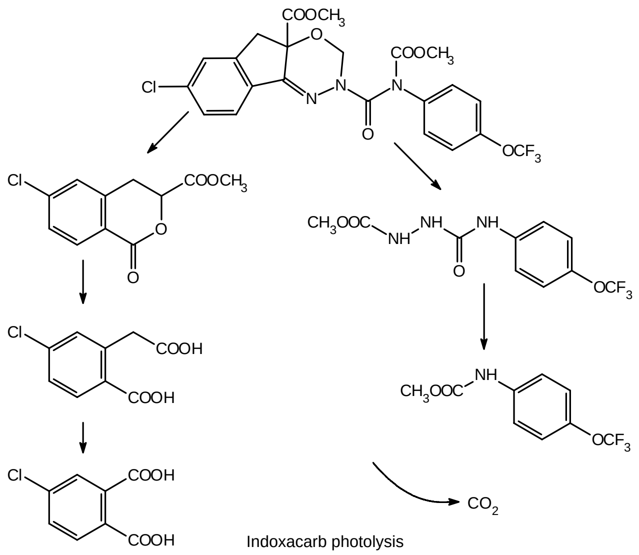


Indoxacarb hydrolysis

Chiral analysis showed that indoxacarb and its R enantiomer hydrolysed in sterile water at the same rate.

Photolysis of indoxacarb technical (Lentz, 2002b)

A number of photolysis products, including CO_2 were identified in amounts exceeding 10% (on at least one sampling occasion) of the starting material when technical indoxacarb at 0.1 mg/L in pH 5 sterile aqueous solution at 25°C was subjected to photolysis for 15 days, equivalent to 30 days' midday natural sunlight at 50° N latitude.



Indoxacarb photolysis

Chiral analysis showed that indoxacarb and its R enantiomer photolytically degraded in sterile water at the same rate.

Formulations

Racemic indoxacarb was developed originally, followed by technical material (TC) containing 3 parts of indoxacarb and 1 part of inactive enantiomer. A current WG formulation described as a 30WG contains 300 g/kg indoxacarb and 100 g/kg inactive enantiomer. The following table shows the manufacturer's codes for the various components.

Code	Indoxacarb (DPX-KN128)	Inactive enantiomer (R enantiomer) (IN-KN127)	Description (TC = technical material)
DPX-JW062	50%	50%	racemic TC
DPX-MP062	75%	25%	TC

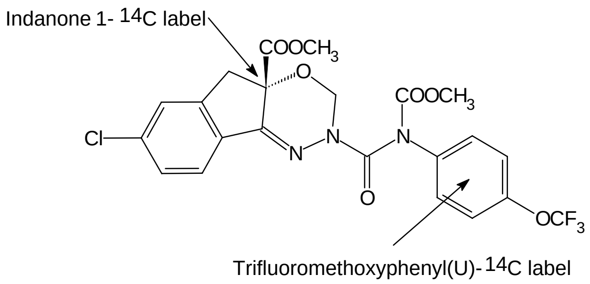
For the purposes of this evaluation DPX-JW062 will be referred to as "racemic indoxacarb." DPX-MP062 will be referred to as "indoxacarb 3S+1R". Residues, where the two enantiomers are not in a defined ratio, will be described as "indoxacarb + R enantiomer".

Indoxacarb is available in the following formulations:

SC	50 g/L, 100 g/L, 150 g/L
WG	300 g/kg
WP	100 g/kg
WP	10 g/kg indoxacarb + 20 g/kg teflubenzuron
WP	15 g/kg indoxacarb + 100 g/kg etofenprox

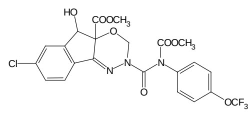
METABOLISM AND ENVIRONMENTAL FATE

Animal and plant metabolism and environmental fate studies used racemic indoxacarb and indoxacarb 3S+1R labelled at the 1-indanone carbon or uniformly labelled in the aromatic ring of the trifluoromethoxyphenyl moiety.

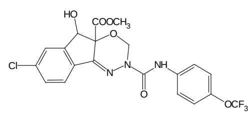


Structures, names and codes for metabolites are summarised below.

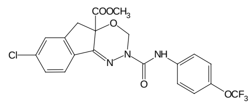
5-OH-DPX-JW062
methyl 7-chloro-2,5-dihydro-5-hydroxy-2-[[(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3*H*)carboxylate



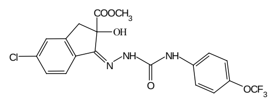
5-OH-IN-JT333
methyl 7-chloro-2,5-dihydro-5-hydroxy-2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3*H*)carboxylate



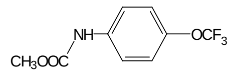
IN-JT333 [CAS No. 144171-39-1]
methyl 7-chloro-2,5-dihydro-2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-*e*][1,3,4]oxadiazine-4a(3*H*)-carboxylate



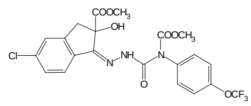
IN-JU873 [CAS No. 144172-25-8]
methyl 5-chloro-2,3-dihydro-2-hydroxy-1-[[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]hydrazono]-1*H*-indene-2-carboxylate



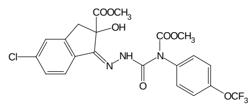
IN-KB687 [CAS No. 177905-10-1]
methyl [4-(trifluoromethoxy)phenyl] carbamate



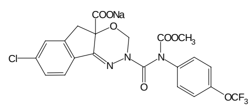
IN-KG433 [S-enantiomer CAS No. 526224-31-7]
(*E*)-methyl 5-chloro-2,3-dihydro-2-hydroxy-1-[[[(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]amino]carbonyl]hydrazono]-1*H*-indene-2-carboxylate



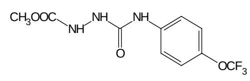
IN-KT319
(*Z*)-methyl 5-chloro-2,3-dihydro-2-hydroxy-1-[[[(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]amino]carbonyl]hydrazono]-1*H*-indene-2-carboxylate



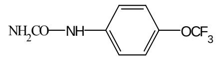
IN-KT413
indeno[1,2-e][1,3,4]oxadiazine-4a(3*H*)-carboxylic acid, 7-chloro-2,5-dihydro-2-[[(methoxycarbonyl)[4-(trifluoromethoxy) phenyl]amino]carbonyl]-, sodium salt



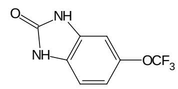
IN-MF014
methyl 2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]hydrazine carboxylate



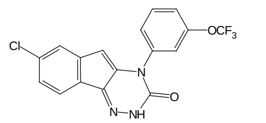
IN-MK638 [CAS No. 82971-90-2]
N-[4-(trifluoromethoxy)phenyl]urea



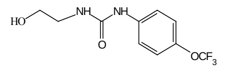
IN-MK643
1,2-dihydro-5-(trifluoromethoxy)-*2H*-benzimidazol-2-one



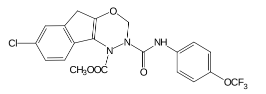
IN-ML438
7-chloro-2,4-dihydro-4-[4-(trifluoromethoxy)phenyl]-*3H*-indeno[2,1-e]-1,2,4-triazin-3-one



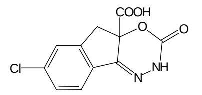
IN-MN470
urea, N-(2-hydroxyethyl)-N'-[4-(trifluoromethoxy)phenyl]urea



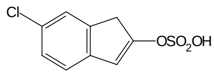
IN-MP819
indeno[1,2-e][1,3,4]oxadiazine-1(2*H*)-carboxylic acid, 7-chloro-3,5-dihydro-2-[[[4-(trifluoromethoxy)-phenyl]amino]carbonyl]-, methyl ester



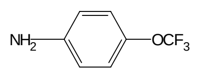
IN-MU716
7-chloro-2,5-dihydro-3-oxoindeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylic acid



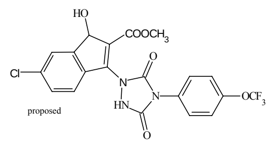
IN-MX829 [CAS No. 7444-81-8] (as sulphate)
5-chloro-1,3-dihydro-*2H*-indene-2-one



IN-P0036 [CAS No. 461-82-5]
4-(trifluoromethoxy)aniline



Metabolite F, hen metabolism, proposed structure
[*tentative name*] 1-(3-(6-chloro-1-hydroxy-2-methoxycarbonylindene)-4-(4-trifluoromethoxyphenyl)-1,2,4-triazole-2,3,4,5-tetrahydro-3,5-dione



Animal metabolism

The Meeting received animal metabolism studies with indoxacarb in rats, lactating dairy cows and laying hens.

Rats

Himmelstein (1997, HL-1997-00439) dosed rats orally with [^{14}C] indoxacarb 3S+1R labelled in the indanone ring and showed that it was readily absorbed followed by extensive metabolism and excretion. Major metabolites identified were IN-JT333, IN-MU716 and IN-MX829 sulphate.

Himmelstein (1997, HLR 283-96) dosed rats orally with [^{14}C] racemic indoxacarb labelled in the indanone ring or in the trifluoromethoxyphenyl ring. The major urinary metabolite was IN-MU716 while IN-JT333 was the major metabolite in the fat.

Dairy cows

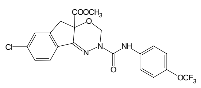
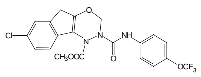
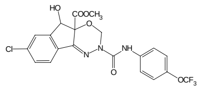
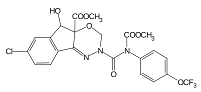
Two lactating Friesian dairy cows weighing 512 and 496 kg on the initial day were dosed orally once daily for 5 consecutive days by gelatin capsule with 200 mg/animal/day of [^{14}C] racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring, equivalent to 10 ppm in the feed (Scott, 1997, AMR 2979-94) for a 20 kg/day feed consumption. Milk was collected twice daily; a day's sample began in the afternoon after dosing and ended with the morning milking preceding the next dose. The animals were slaughtered 23.5 hours after the final dose for tissue collection. Recovery of administered ^{14}C was 74% for the indanone label and 82% for the trifluoromethoxyphenyl ring label.

The majority of the administered ^{14}C (indanone label quoted first each time) was excreted in the faeces (53% and 60%) and urine (19.3% and 19.8%). Milk accounted for 0.8% and 0.7% of the administered ^{14}C while tissues accounted for 0.79% and 0.84%. The distribution of the radiolabel and identified metabolites in milk and tissues are summarised in Table 1 and Table 2.

Parent compound was the major identified component of the residue in milk and each of the tissues.

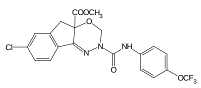
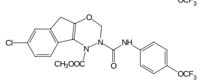
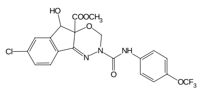
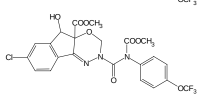
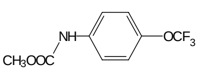
Chiral HPLC analysis of parent in milk (day 5 and pooled) and kidneys showed S:R enantiomer ratios of 2:1 and 2-2.5:1 respectively, a change from the starting ratio of 1:1.

Table 1. Distribution of ^{14}C residue and identified metabolites in milk and tissues of dairy cows dosed orally for 5 days with 200 mg/animal/day of [^{14}C]racemic indoxacarb, labelled in the indanone ring, equivalent to 10 ppm in the feed (Scott, 1997, AMR 2979-94).

Compound	Concentration, mg/kg, expressed as parent				
	Composite milk	Foreleg muscle	Liver	Kidney	Perirenal fat
Total ^{14}C residue	0.11	0.04	0.54	0.37	1.1
Extracted residue	0.059	0.032	0.29	0.26	1.07
Indoxacarb + R enantiomer	0.028	0.01	0.038	0.15	0.89
IN-JT333 	nd	nd	< 0.01	nd	0.06
IN-MP819 Note 	0.023		< 0.01	nd	
5-OH-IN-JT333 	nd	nd	< 0.01	nd	
5-OH-DPX-JW062 	nd	< 0.01	0.030	0.023	
5-OH-DPX-JW062 glucuronide	nd	nd	0.024	nd	nd

nd: not detected, limit of detection ~ 0.01 mg/kg.
Note: IN-MP819 may be an artefact of the degradation of IN-KT413.

Table 2. Distribution of ^{14}C residue and identified metabolites in milk and tissues of dairy cows dosed orally for 5 days with 200 mg/animal/day of [^{14}C] racemic indoxacarb, labelled in the trifluoromethoxyphenyl ring, equivalent to 10 ppm in the feed (Scott, 1997, AMR 2979-94).

Compound	Concentration, mg/kg, expressed as parent				
	Composite milk	Foreleg muscle	Liver	Kidney	Perirenal fat
Total ^{14}C residue	0.057	0.05	0.69	0.29	1.1
Extracted residue	0.051	0.04	0.40	0.25	1.03
Indoxacarb + R enantiomer	0.028	0.02	0.079	0.18	0.72
IN-JT333 	nd	nd	< 0.01	nd	0.08
IN-MP819 Note 	0.016		< 0.01	nd	
5-OH-IN-JT333 	nd	nd	< 0.01	nd	
5-OH-DPX-JW062 	nd	< 0.01	0.063	0.037	
5-OH-DPX-JW062 glucuronide	nd	nd	0.019	nd	nd
IN-MN470 + IN-MF014	nd	nd	0.060	nd	nd
IN-KB687 	nd	nd	0.022	nd	nd

nd: not detected, limit of detection ~ 0.01 mg/kg.
Note: IN-MP819 may be an artefact of the degradation of IN-KT413.

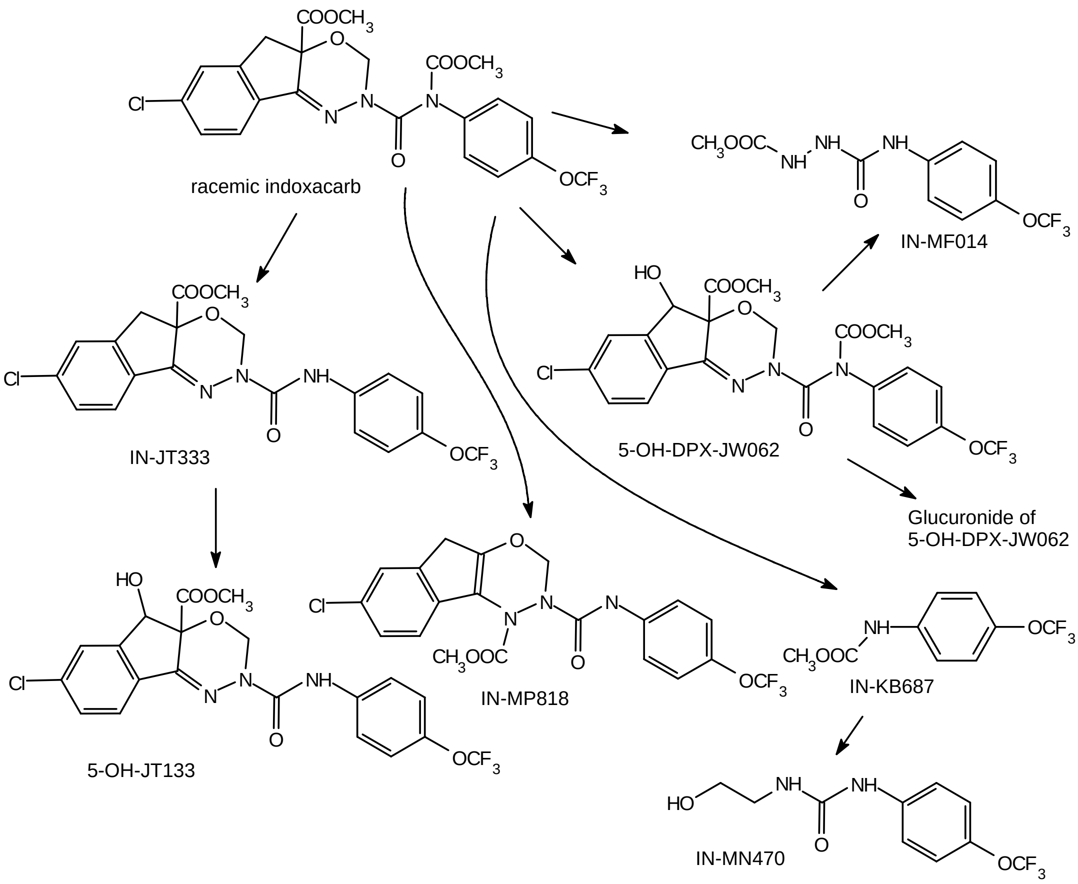


Figure 1. Proposed metabolic pathway for racemic indoxacarb in cows.

Hens

Two groups of white leghorn laying hens (5 birds in each group) mean body weight 1.44 kg at study initiation were dosed orally once daily for 5 consecutive days with 1.2 mg/bird/day of [^{14}C] racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring, equivalent to 10 ppm in the feed (Li, 1997, AMR 3187-94) for a 120 g/day feed consumption. Eggs were collected daily. The birds were slaughtered 22–23.5 hours after the final dose for tissue collection. Recovery of administered ^{14}C was 89.7% for the indanone label and 89.3% for the trifluoromethoxyphenyl ring label.

The majority of the administered ^{14}C (indanone label quoted first each time) was excreted in the faeces (88% and 87%). Eggs accounted for 0.40% and 0.28% of the administered ^{14}C while tissues, blood and skin accounted for 1.4% and 1.5%. The distribution of the radiolabel and identified metabolites in eggs and tissues are summarised in Table 3 and Table 4.

Total ^{14}C concentrations in egg yolks at day 5 were approximately 2.5-2.8 times the concentrations at day 3, suggesting that indoxacarb residues had not reached a plateau at day 5. More residue appeared in the egg yolk than in the egg white, suggesting a tendency for fat solubility in the residue components. Parent compound constituted 3–4% of the total ^{14}C in egg yolk. Major metabolites in egg yolk were IN-KG433 + IN-KT319 at 18-26% of total ^{14}C and Metabolite F at 7-14% of total ^{14}C.

Metabolites IN-KG433 and IN-KT319 are enantiomers. In egg yolks, the ratio of IN-KG433 (the S enantiomer) concentration to IN-KT319 concentration was approximately 2.4:1, suggesting different rates of formation or depletion.

Fat contained the highest concentration of residue, where the main component, Metabolite F constituting 45 and 38% of the total ^{14}C in the fat, was tentatively identified as a product of IN-KG433, initially produced by fracture of the oxadiazine ring. Parent compound constituted 5 and 6% of the total ^{14}C in the fat. Metabolite IN-JT333 constituted 16 and 18% of the total ^{14}C in the fat. Residues in breast muscle and thigh muscle were generally too low for metabolite identification. Parent compound accounted for approximately 4% of the total ^{14}C in liver.

Table 3. Distribution of ^{14}C residue and identified metabolites in tissues of laying hens dosed orally for 5 days with 1.2 mg/bird/day of [^{14}C]racemic indoxacarb, labelled in the indanone ring, equivalent to 10 ppm in the feed (Li, 1997, AMR 3187-94).

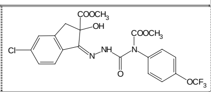
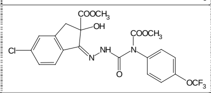
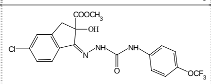
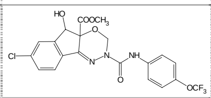
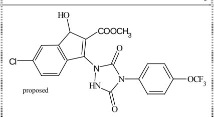
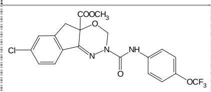
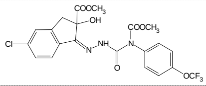
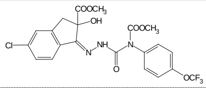
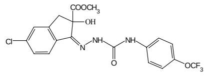
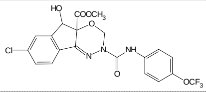
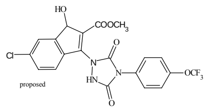
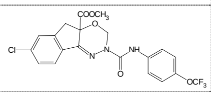
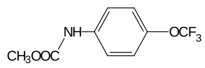
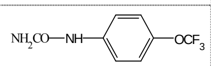
Compound		Concentration, mg/kg, expressed as parent							
		Fat	Skin + fat	Liver	Gizzard	Thigh muscle	Breast muscle	Egg white, day 5	Egg yolk, day 5
Total ^{14}C residue		0.46	0.21	0.11	0.08	0.04	0.02	0.099	0.31
Extracted residue		0.45	0.21	0.05	0.06	0.04	0.02	0.09	0.25
Indoxacarb + R enantiomer		0.02	0.04	0.01	0.02	< 0.01	< 0.01		0.01
IN-KG433		0.03	0.01	0.01	< 0.01	< 0.01	< 0.01		0.04
IN-KT319		0.02	0.01			< 0.01	< 0.01		0.02
IN-JU873		0.01	< 0.01	0.02	0.01	< 0.01	< 0.01		0.02
5-OH-JT333		0.07	0.03						0.04
Metab F		0.22	0.06	0.01	0.01	< 0.01	< 0.01		0.05
IN-JT333		0.08	0.04		0.01	< 0.01	< 0.01		0.02

Table 4. Distribution of ^{14}C residue and identified metabolites in tissues of laying hens dosed orally for 5 days with 1.2 mg/bird/day of [^{14}C]racemic indoxacarb, labelled in the trifluoromethoxyphenyl ring, equivalent to 10 ppm in the feed (Li, 1997, AMR 3187-94).

Compound		Concentration, mg/kg, expressed as parent							
		Fat	Skin + fat	Liver	Gizzard	Thigh muscle	Breast muscle	Egg white, day 5	Egg yolk, day 5
Total ^{14}C residue		0.51	0.25	0.15	0.13	0.04	0.02	0.05	0.33
Extracted residue		0.50	0.25	0.09	0.09	0.03	0.02	0.05	0.31
Indoxacarb + R enantiomer		0.03	0.02	0.01	0.02	< 0.01	< 0.01		0.01
IN-KG433		0.03	0.02	0.01	0.01	< 0.01	< 0.01		0.04
IN-KT319		0.03	0.02			< 0.01	< 0.01		0.02
IN-JU873		0.01	0.02	0.03	0.01	0.01	< 0.01		0.03
5-OH-JT333		0.08	0.03						0.04
Metab F		0.19	0.04	0.01	0.01	< 0.01	< 0.01		0.04
IN-JT333		0.09	0.03		0.01	< 0.01	< 0.01		0.02
IN-KB687		0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.01	0.03
IN-MK638				0.01	0.01	0.01	< 0.01	0.01	0.03

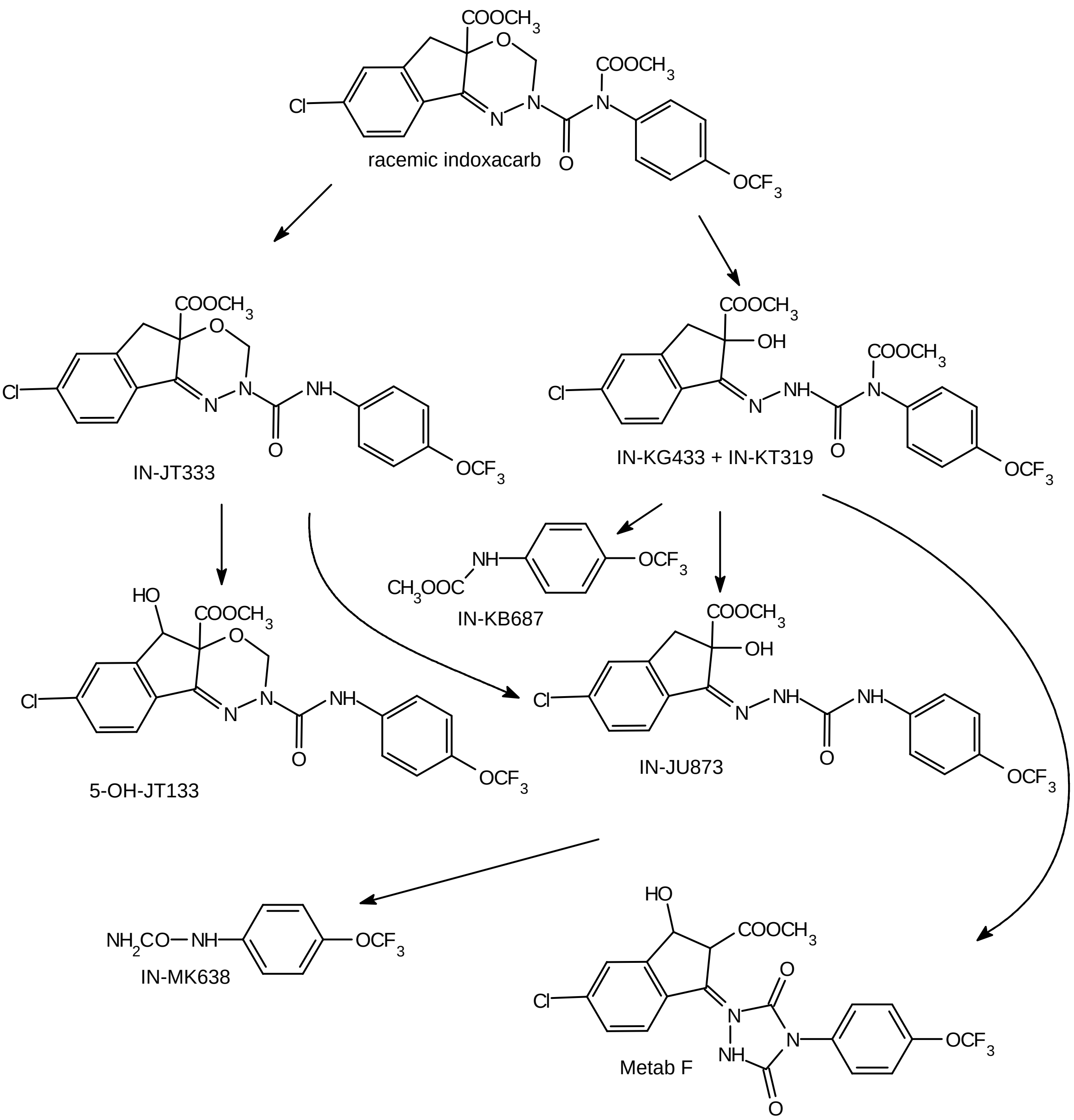


Figure 2. Proposed metabolic pathway for racemic indoxacarb in poultry.

Plant metabolism

The Meeting received plant metabolism studies with racemic indoxacarb on cotton, lettuce, grapes and tomatoes.

In each crop tested, parent compound mostly represented more than 90% of the total ^{14}C residue and was essentially the only compound detected. In grapes and tomatoes the residue was found to be mostly a surface residue. Chiral HPLC analysis of the residues in tomatoes showed that the enantiomers remained in a 1:1 ratio.

Cotton

In a plant metabolism study in Mississippi, cotton plants were treated with a single application of formulated [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Scott and Guseman, 1997, AMR 2691-93). Plants were sampled at 7, 14, 30 and 59 days post-treatment and at maturity, 90 days after treatment. In plant samples, parent compound mostly represented more than 90% of the total ^{14}C residue. Chiral analysis of parent compound demonstrated that it remained racemic.

An isolated cotton leaf was treated with labelled compound and housed in a closed vessel while exposed to UV light. After 21 days, approximately 4.7% of the ^{14}C had been converted to CO_2.

Table 5. ^{14}C residues on cotton plants treated with formulated [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Scott and Guseman, 1997, AMR 2691-93).

Day	Concentration, mg/kg of ^{14}C expressed as parent									
	Indanone label					trifluoromethoxyphenyl label				
	TRR	TRR extracted	Racemic indoxacarb	TRR hydrolysed	TRR unextracted	TRR	TRR extracted	Racemic indoxacarb	TRR hydrolysed	TRR unextracted
0	7.1	7.0	6.9	0.028	0.085	13.6	13.2	13.2	0.11	0.26
7	6.3	6.2	5.6	0.041	0.12	7.4	7.2	6.9	0.061	0.14
14	2.2	2.2	2.0	0.043	0.040	3.3	3.3	3.0		
30	0.90	0.86	0.72			0.97	0.92	0.79	0.027	0.025
59	0.82	0.76	0.69	0.017	0.046	0.50	0.50	0.41		
90 plant	0.019	0.013	0.011			0.053	0.046	0.045		
90 seed	0.007	< 0.001				0.005	< 0.001			

Lettuce

In a plant metabolism study, lettuce plants at the 4-5 leaf stage were treated with a single application of formulated [14C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Gaddamidi and Hashinger, 1997, AMR 2730-93). Plants were sampled at 0, 7, 14, 21, 28 and 35days (mature) post-treatment. Even on day 0 less than half of the residue was on the surface and the % on the surface decreased further with time after treatment. Parent compound was the only component found in the residue. Also in an experiment with an exaggerated application rate (5×) of racemic indoxacarb, only parent compound was detected in the residue.

Table 6. Residues in and on lettuce plants treated with formulated [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Gaddamidi and Hashinger, 1997, AMR 2730-93).

Day	Concentration, mg/kg of ^{14}C expressed as parent							
	Indanone label				trifluoromethoxyphenyl label			
	TRR	TRR surface	TRR extracted	Racemic indoxacarb	TRR	TRR surface	TRR extracted	Racemic indoxacarb
0	11.2	5.5	6.4	11.9	10.8	3.95	6.5	10.5
7	5.2	2.2	2.9	5.1	4.8	2.1	2.5	4.6
14	2.7	0.57	2.1	2.6	2.5	0.77	1.5	2.3
21	1.4	0.38	1.0	1.4	1.3	0.29	0.94	1.2
28	0.56	0.059	0.47	0.53	0.36	0.058	0.29	0.35
35	0.47	0.072	0.40	0.47	0.20	0.022	0.17	0.19

Grapes

Grape vines at the early fruit development stage were treated with a single foliar application of formulated [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Gaddamidi and Hashinger, 1997, AMR 2729-93).

Grape leaves and grapes were sampled on days 0, 14, 46 and 66 (mature) post-treatment. In addition, grape leaves were sampled on days 7 and 31. The majority of the residue associated with the fruit was surface residue, with 52% and 75% still surface residues 66 days after treatment. Parent compound was essentially the only component of the residue at all times. The majority of the residue on leaves was also a surface residue.

Table 7. Residues in and on grapes from vines treated with formulated [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring at the equivalent of 500 g racemic indoxacarb/ ha (Gaddamidi and Hashinger, 1997, AMR 2729-93).

Day	Concentration, mg/kg of ^{14}C expressed as parent							
	Indanone label				trifluoromethoxyphenyl label			
	TRR	TRR surface	TRR extracted	Racemic indoxacarb	TRR	TRR surface	TRR extracted	Racemic indoxacarb
0	3.0	2.7	0.29	3.0	3.7	3.4	0.22	3.6
14	0.84	0.72	0.10	0.80	0.80	0.72	0.06	0.77
46	0.09	0.06	0.03	0.08	0.18	0.13	0.05	0.17
66	0.38	0.20	0.17	0.35	0.34	0.26	0.08	0.33

Tomatoes

Tomato vines, variety Heinz 8892, were treated with 4 foliar applications, approximately 6-10 days apart, of formulated [^{14}C]racemic indoxacarb, labelled in the trifluoromethoxyphenyl ring at the equivalent of 4 × 150 g racemic indoxacarb/ ha (Brown and Young, 1997, AMR 3561-95). Tomato leaf and fruit samples were taken before and after each treatment (except the first where no fruit were available) and 3, 7 and 14 days (final harvest) after the final application, or 38 days after the first application. The majority of the residue associated with the fruit was surface residue, mostly around 90% of the residue. Parent compound was essentially the only component of the residue at all times. The majority of the residue on leaves was also a surface residue.

Parent compound isolated from the leaf extracts from samples collected before the second application and at harvest, 14 days after final application, were subjected to chiral HPLC analysis, which demonstrated that the two enantiomers remained in a 1:1 ratio.

Table 8. ^{14}C residues in and on tomatoes from plants treated with formulated [^{14}C]racemic indoxacarb, labelled in the trifluoromethoxyphenyl ring at the equivalent of 4×150 g racemic indoxacarb /ha (Brown and Young, 1997, AMR 3561-95).

Timing	Concentration, mg/kg of ^{14}C expressed as parent				
	TRR	TRR surface	TRR extractable 1/	TRR unextractable	Racemic indoxacarb
Before 2nd treatment	0.04	0.04		< 0.01	
After 2nd treatment	0.14	0.14		< 0.01	0.04
Before 3rd treatment	0.12	0.11	0.01	< 0.01	0.14
After 3rd treatment	0.09	0.08		0.01	0.12
Before 4th treatment	0.06	0.05		0.01	0.05
After 4th treatment	0.12	0.12		0.01	0.11
3 days after final treatment	0.14	0.13		0.01	0.13
7 days after final treatment	0.10	0.09		0.01	0.09
14 days after final treatment	0.08	0.07		0.01	0.07

1/ TRR extractable only conducted on sample from before 3rd treatment.

Environmental fate in soil

The Meeting received information on the environmental fate of indoxacarb in soil, including studies on aerobic soil metabolism, field dissipation and crop rotational studies. Because indoxacarb is used on peanuts and potatoes (edible portion in soil), studies on aerobic soil metabolism are needed and studies on field dissipation are helpful.

Soil metabolism

A study on the aerobic soil metabolism of [^{14}C]racemic indoxacarb in a silt loam soil showed that indoxacarb + R enantiomer degraded quickly and identifiable metabolites were a minor part of the residue and mostly also degraded relatively quickly (Singles, 2002, AMR 2803-93). The indanone ring was mineralized more quickly than the trifluoromethoxyphenyl ring. The non-extractable ^{14}C had begun to decline within 90 days.

Aerobic soil metabolism			Ref: Singles, 2002, AMR 2803-93
Test material: [^{14}C]racemic indoxacarb, indanone ring label		Dose rate: 7 mg/kg dry soil	
Silt loam	pH: 6.2, 6.3	Organic matter: 2.4, 2.7%	
1. Duration: 364 days	Temp: 25°C	Moisture: 75% of 0.33 bar moisture	
Half-life of racemic indoxacarb: approx 2-3 days (methods would not have detected epimerization)			
% indoxacarb + R enantiomer remaining, day 364 = 0.55 %		% mineralization, day 364 = 36 %	
Metabolites	Max (% of dose)	Day	
IN-JT333	17 %	3	
IN-KG433	9.9%	2	
IN-ML438	7.6 %	3	
Non-extractable ^{14}C	52 %	90	
2. Duration: 120 days	Temp: 25°C	Moisture: 75% of 0.33 bar moisture	
Half-life of racemic indoxacarb: approx 2-3 days (methods would not have detected epimerization)			
% indoxacarb + R enantiomer remaining, day 120 = 9.9 %		% mineralization, day 120 = 26 %	
Metabolites	Max (% of dose)	Day	
IN-JT333	12 %	5	
IN-KG433	3.1 %	5	
IN-ML438	7.0 %	21	
Non-extractable ^{14}C	42 %	21	

Aerobic soil metabolism			Ref: Singles, 2002, AMR 2803-93
Test material: [^{14}C]racemic indoxacarb, TFP ring label		Dose rate: 7 mg/kg dry soil	
Silt loam	pH: 6.2, 6.3	Organic matter: 2.4, 2.7%	
1. Duration: 364 days	Temp: 25°C	Moisture: 75% of 0.33 bar moisture	
Half-life of racemic indoxacarb: approx 2-3 days (methods would not have detected epimerization)			
% indoxacarb + R enantiomer remaining, day 364 = 2.2 %		% mineralization, day 364 = 7.5 %	
Metabolites	Max (% of dose)	Day	
IN-JT333	13 %	2	
IN-KG433	17 %	3	
IN-ML438	5.8 %	30	
IN-MK643	8.2	180	
Non-extractable ^{14}C	66%	90	
2. Duration: 120 days	Temp: 25°C	Moisture: 75% of 0.33 bar moisture	
Half-life of racemic indoxacarb: approx 2-3 days (methods would not have detected epimerization)			
% indoxacarb + R enantiomer remaining, day 120 = 7.2 %		% mineralization, day 120 = 5.4 %	
Metabolites	Max (% of dose)	Day	
IN-JT333	17 %	5	
IN-KG433	6.2 %	5	
IN-ML438	7.2 %	120	
IN-MK643	6.6 %	30-60	
Non-extractable ^{14}C	57 %	90	

Singles (2004, DuPont-15311) reviewed the environmental fate studies on indoxacarb mixtures in soil and aquatic systems, also explaining some of the analytical difficulties in identifying metabolites in the soil metabolism studies and the progress with methods since the early studies on indoxacarb. Acidic mobile phases in HPLC degrade some of the soil metabolites, so mobile phases have been modified. New stationary phases provide better separation of degradation products than previously achieved. Metabolite IN-KT413 rearranges to IN-MP819 in pure acetonitrile, but can be stabilised in extractants containing at least 20% water.

Indoxacarb and its R enantiomer were shown, by chiral chromatography analysis, to degrade at the same rate in soil and water systems.

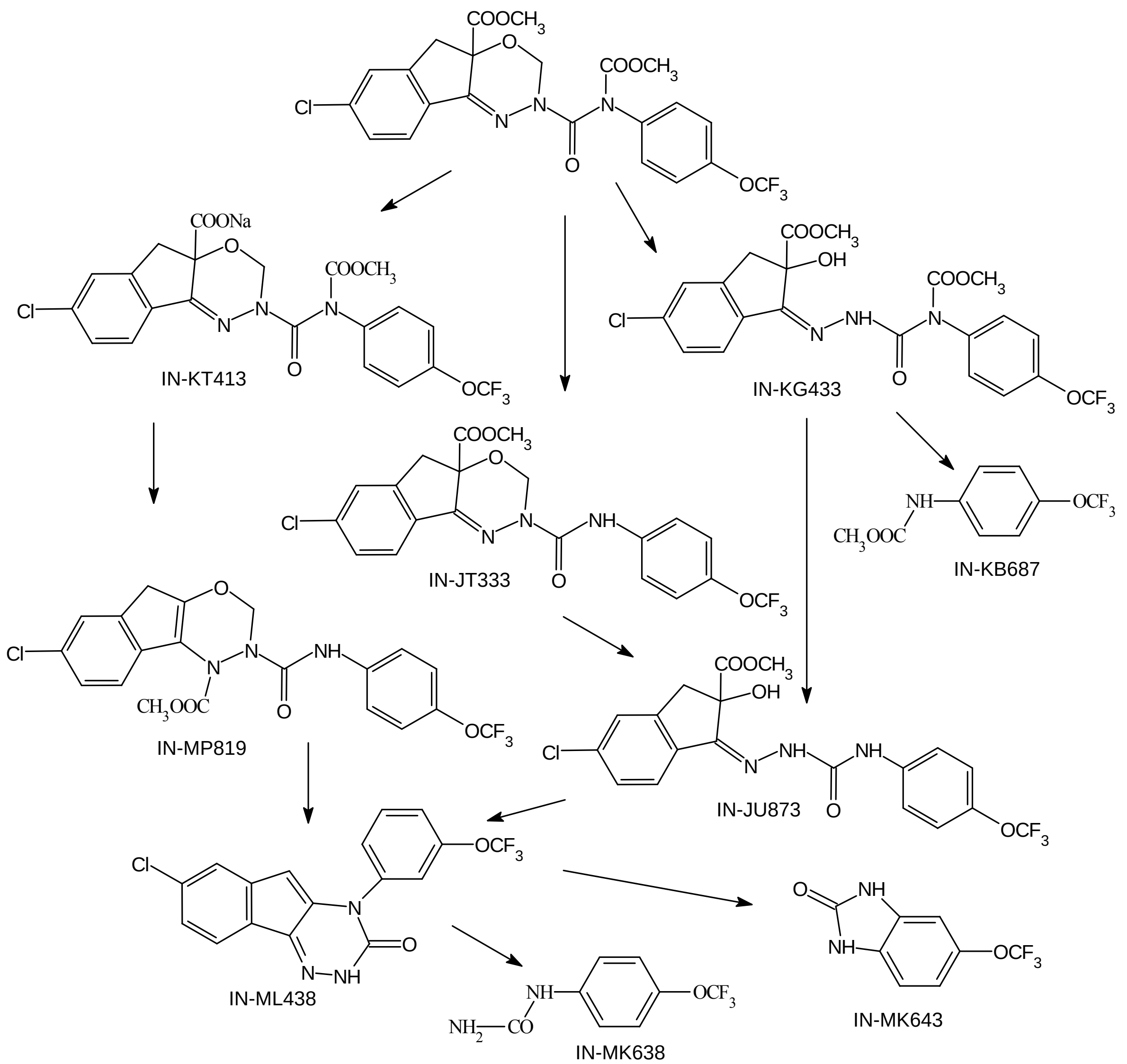


Figure 3. Proposed metabolic pathway for indoxacarb 3S+1R in aerobic soil (Singles, 2004, DuPont-15311).

Field dissipation

Rühl (1997, AMR 3400-95) tested the persistence and mobility of [^{14}C] labelled racemic indoxacarb when applied to the bare soil in 4 different soils in the USA in 1995. Very little of the applied racemic indoxacarb moved below the top 15 cm of the soil during the trials of duration up to 18 months. Indoxacarb + R enantiomer concentrations declined to half of their initial values in 7 days to 6 months (Figure 4).

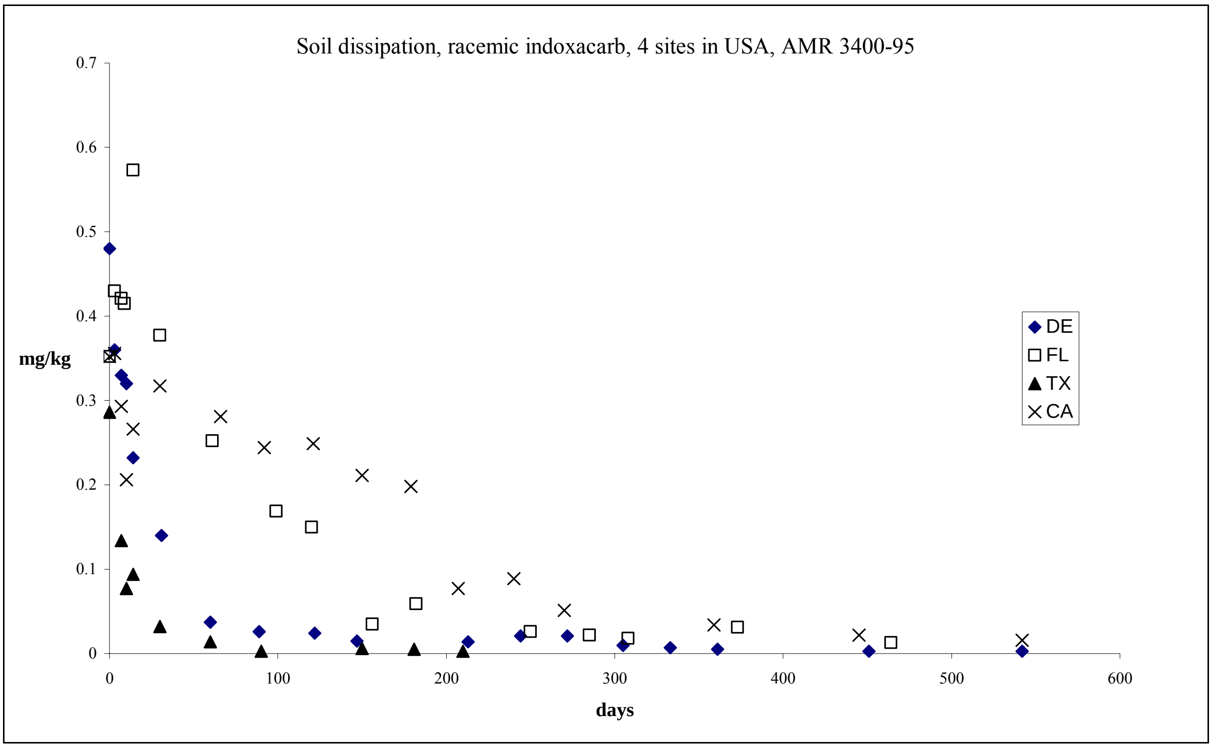


Figure 4. Disappearance of indoxacarb + R enantiomer from the top 15 cm of soil at 4 sites in USA (Rühl, 1997, AMR 3400-95) after 1 application of 0.85-1 kg/ha on to bare soil.

At two of the sites after 12 months the indoxacarb + R enantiomer levels declined to approximately 8–10% of their initial values and at the other two sites they had declined to approximately 1% of the initial values (Table 9). Only low concentrations of indoxacarb + R enantiomer were detected in the 15–30cm soil (2.6–6.6% of initial soil concentration in the 0–15 cm soil). Metabolite IN-JT333 was detected in the 0–15 cm soil in the 4 trials, reaching 3.3–5.4% of the initial indoxacarb + R enantiomer concentrations. Metabolite IN-KG433 was detected in 2 of the 4 soils reaching 1.4–1.5% of the initial indoxacarb + R enantiomer concentrations.

Table 9. Field dissipation of [^{14}C] labelled racemic indoxacarb in 4 different soils in the USA in 1995 (Rühl, 1997, AMR 3400-95).

Trial	Applic rate, kg/ha	Initial conc, mg/kg 1/	Indoxacarb + R enantiomer as % of original concentration in 0-15 cm soil. Residues are reported as mean of 2 treatments, one with indoxacarb labelled in the indanone ring and the other in the trifluoromethoxyphenyl ring.				
			1 month	3 months	6 months	12 months	longest time measured
USA (DE) 1995	Plot area 3.4 sq m. Silt loam: pH 5, 20% sand, 67% silt, 14% clay, 2.9% organic matter.						
treat in July	1.0	0.48 (0.50)	29%	5.4%	3.1%	1.0%	0.6% (18 months)
USA (FL) 1995	Plot area 3.4 sq m. Loamy sand: pH 5.6, 85% sand, 11% silt, 4% clay, 1.2% organic matter.						
treat in January	0.85	0.35 (0.44)	107%	48%	17%	8.8%	3.7% (15 months)
USA (TX) 1995	Plot area 3.4 sq m. Sandy clay loam: pH 8, 44% sand, 24% silt, 31% clay, 1.2% organic matter.						
treat in August	1.0	0.29 (0.51)	11%	1.0%	1.7%		1.0% (7 months)
USA (CA) 1995	Plot area 3.4 sq m. Sandy loam: pH 8, 57% sand, 30% silt, 13% clay, 1.1% organic matter.						
treat in October	0.86	0.35 (0.44)	90%	69%	56%	9.7%	4.5% (18 months)

1/ Theoretical initial concentration is shown in parentheses.

Vincent *et al*. (1997, AMR 3402-95) studied the field persistence and mobility of racemic indoxacarb at two sites in the USA. Soil characteristics in the top 15 cm at the Florida site were: pH

5.7, sand 92%, silt 4.0%, clay 4.0%, organic matter 0.75, classified as a sand; and at the California site were: pH 7.7, sand 51%, silt 36%, clay 13%, organic matter 1.5%, classified as a loam or sandy loam.

Racemic indoxacarb was applied to bare soil 4 times at 0.17 kg/ha on days 0, 3, 6 and 9 of the trials. Soil cores of 0–15, 15–30, 30–45, 45–60 and 60–90 cm were periodically taken from the 3 treated plots at each site for residue analysis. Soil moistures were determined by oven drying separate subsamples and residues were expressed on soil dry weight. Soil samples were analysed for indoxacarb + R enantiomer and metabolites IN-JT333 and IN-KG433.

Residues of indoxacarb + R enantiomer disappeared from the top 15 cm of soil with half-lives of 55 days for the Florida site and 60 days for the California site, calculated on residue data from 9 days (final application) to 1 year (Figure 5). Indoxacarb +R enantiomer occurred at low levels around 0.005 mg/kg occasionally and intermittently in soils from the 15–30 cm profile at both sites. Metabolite IN-JT333 reached its peak concentration in the Florida soil on day 14 (0.012 mg/kg) and on day 100 in the California soil (0.010 mg/kg). Metabolite IN-KG433 did not appear in the Florida soil, but was detected, up to 0.005 mg/kg, in the California soil. Neither IN-JT333 nor IN-KG433 appeared in the 15–30 cm profile soil.

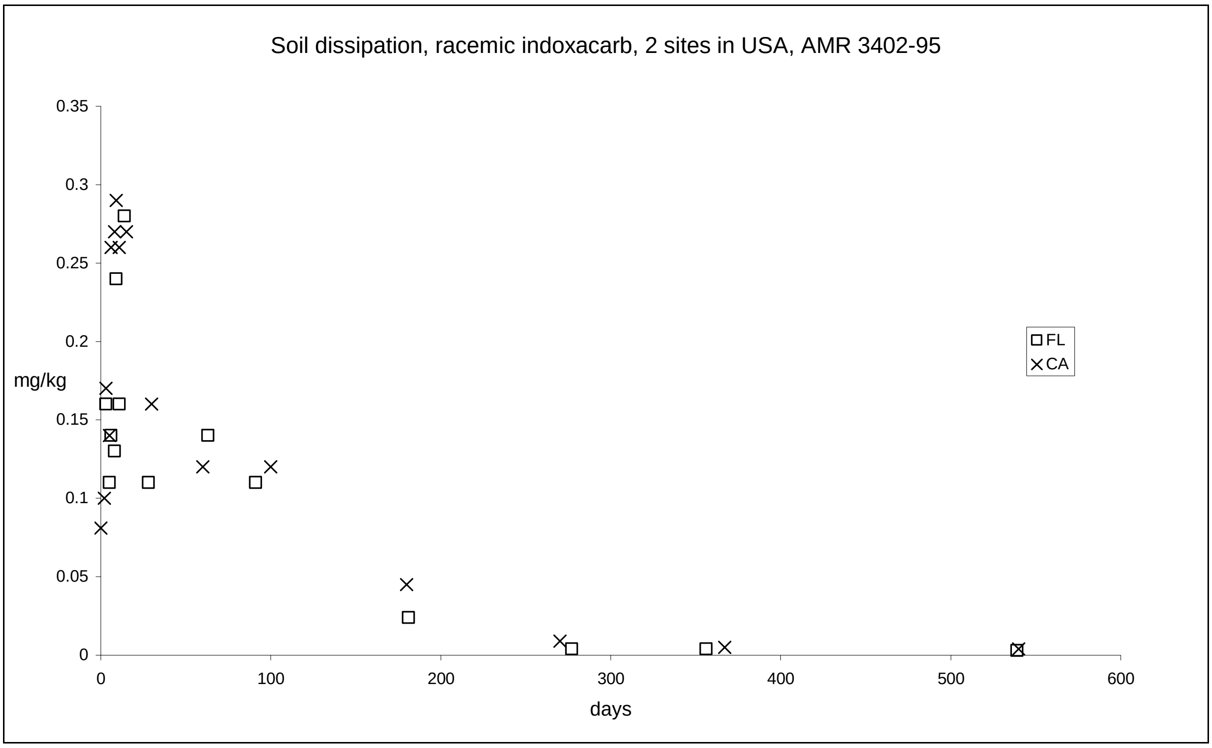


Figure 5. Disappearance of indoxacarb + R enantiomer from the top 15 cm of soil at 2 sites in USA (Vincent *et al*., 1997, AMR 3402-95) after 4 applications of 0.17 kg/ha on to bare ground on days 0, 3, 6 and 9.

Crop rotation studies

Information on the fate of radiolabelled racemic indoxacarb in a confined crop rotational study was made available to the meeting.

In a confined rotational crop study in USA (Freeman and Terranova, 1997, AMR 4029-96) soil (Delaware sandy loam, 1.3% organic matter, pH 6.8) was treated directly with ^{14}C labelled racemic indoxacarb at 0.60 kg/ha equivalent to 0.30 kg ai/ha. Crops of carrots, lettuce, wheat and soybeans were sown into the treated soil at intervals of 36, 90 and 125 days after treatment. Crops were grown to maturity, subsequently harvested and analysed for ^{14}C content (Table 10). Samples were further examined by extraction and HPLC analysis but no parent compound or potential metabolite (IN-JT333) was observed. Low levels (≤ 0.05 mg/kg) of unidentifiable components were observed, with different patterns for the two different label positions suggesting that the parent compound was fragmented.

Table 10. Confined rotational crop studies with labelled racemic indoxacarb. Soil was treated with ^{14}C labelled racemic indoxacarb at 0.60 kg/ha, equiv to 0.30 ai/ha.

Application country, year, ref.	Rotational crop	TSI 1/ days	THI 2/ days	Sample	^{14}C as indoxacarb + R enantiomer mg/kg	Residues, mg/kg
Bare soil, USA, 1996 AMR 4029-96			0	soil	0.56	
			35	soil	0.25	
			90	soil	0.33	
[^{14}C]indanone label			125	soil	0.46	
	carrot (Fontana)	36	134	tops	0.03	3/
		36	134	roots	0.01	3/
	lettuce (Prizehead)	36	101	leaves	0.01	3/
	spring wheat (Katepawa)	36	64	forage	0.14	3/
		36	141	straw	0.49	3/
		36	141	grain	0.24	3/
	soybean (A2242)	36	64	forage	0.06	3/
		36	155	hay	0.07	3/
		36	155	seed	0.03	3/
	carrot (Fontana)	90	195	tops	0.04	3/
		90	195	roots	0.01	na
	lettuce (Prizehead)	90	156	leaves	0.01	na
	spring wheat (Katepawa)	90	119	forage	0.04	3/
		90	240	straw	0.12	3/
		90	240	grain	0.04	3/
	soybean (A2242)	90	119	forage	0.03	3/
		90	188	hay	0.06	3/
		90	188	seed	0.02	3/
	carrot (Fontana)	125	231	tops	0.01	na
		125	231	roots	0.01	na
	lettuce (Prizehead)	125	199	leaves	0.01	na
	spring wheat (Katepawa)	125	156	forage	0.02	3/
		125	254	straw	0.12	3/
		125	254	grain	0.03	3/
	soybean (A2242)	125	156	forage	0.02	3/
		125	225	hay	0.17	3/
		125	225	seed	0.02	3/
Bare soil, USA, 1996 AMR 4029-96			0	soil	0.56	
			35	soil	0.34	
			90	soil	0.25	
[^{14}C]TFP label			125	soil	0.24	
	carrot (Fontana)	36	134	tops	0.07	3/
		36	134	roots	0.02	3/
	lettuce (Prizehead)	36	101	leaves	0.03	3/
	spring wheat (Katepawa)	36	64	forage	0.14	3/
		36	141	straw	0.43	3/
		36	141	grain	0.04	3/
	soybean (A2242)	36	64	forage	0.13	3/
		36	155	hay	0.14	3/
		36	155	seed	0.08	3/
	carrot (Fontana)	90	195	tops	0.04	3/
		90	195	roots	0.01	na
	lettuce (Prizehead)	90	156	leaves	0.01	na

Application country, year, ref.	Rotational crop	TSI 1/ days	THI 2/ days	Sample	^{14}C as indoxacarb + R enantiomer mg/kg	Residues, mg/kg
	spring wheat (Katepawa)	90	119	forage	0.07	3/
		90	240	straw	0.15	3/
		90	240	grain	0.01	3/
	soybean (A2242)	90	119	forage	0.08	3/
		90	188	hay	0.16	3/
		90	188	seed	0.06	3/
	carrot (Fontana)	125	231	tops	0.01	na
		125	231	roots	0.01	na
	lettuce (Prizehead)	125	199	leaves	0.01	na
	spring wheat (Katepawa)	125	156	forage	0.05	3/
		125		straw	0.15	3/
		125		grain	0.01	3/
	soybean (A2242)	125	156	forage	0.05	3/
		125	237	hay	0.08	3/
		125	237	seed	0.04	3/

na: not analysed.
1/ TSI: interval between treatment on soil and sowing of rotation crop, days.
2/ THI: interval between treatment on soil and harvest of rotation crop (or sampling of soil), days.
3/ HPLC analysis did not detect (LOQ 0.01 mg/kg) indoxacarb or metabolite IN-JT333 in any raw agricultural commodity.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The Meeting received descriptions and validation data for analytical methods for residues of indoxacarb in raw agricultural commodities, processed commodities, feed commodities, animal tissues, milk and eggs.

Methods rely on HPLC-UV, GC-ECD and GC-MSD for analysis of indoxacarb in the various matrices. Indoxacarb and its R enantiomer are determined and reported together in all these methods. Signal enhancement by extracts of some matrices may require the preparation of standards in matrix extracts for measurement at low concentrations.

Extraction efficiency has been tested with various solvent mixtures on [^{14}C] indoxacarb incorporated into crop and animal commodities.

Crops and processed fractions (Gagnon and Guinivan, 1996, AMR 3493-95)

Analyte:	Indoxacarb + R enantiomer	GC-MSD	Method AMR 3493-95
LOQ:	Typically 0.02 mg/kg		
Description	Analytes are extracted from crop samples into ethyl acetate after the addition of water. Cotton seed is an exception, requiring extraction into acetonitrile after the addition of hexane to the sample matrix. An aliquot from the extraction solution is concentrated by evaporation under nitrogen and cleaned up by solid phase extraction with silica and carbon. The cleaned-up extract is then analysed by GC-MSD. Signal enhancement by matrix may require standards to be prepared in control matrix solutions, especially for low analyte concentrations.		

Crops and processed fractions (Gagnon *et al*., 1997, AMR 3493-95 s2 r1)

Analyte:	Indoxacarb + R enantiomer	GC-MSD - enforcement	Method AMR 3493-95
LOQ:	Typically 0.2-0.3 mg/kg for most commodities, 1 mg/kg for tomato paste		
Description	See Gagnon and Guinivan, 1996, AMR 3493-95. Standards may be prepared in organic solvent, rather than in control matrix solutions, for residue levels of 0.3 mg/kg and higher if the final analysis solution is more dilute than in the original method. The revised method is suitable as an enforcement method		

Crops (Klemens *et al*., 1997, AMR 2712-93)

Analyte:	Indoxacarb + R enantiomer	HPLC-UV	Method AMR 2712-93
LOQ:	Typically 0.01 mg/kg. Cotton gin trash and maize fodder 0.05 mg/kg.		
Description	Residues are extracted from crop matrix with hexane-acetonitrile and the acetonitrile extract is concentrated and cleaned up by solid-phase extraction with a combination of silica and strong anion exchanger. The analytes are measured by reversed-phase HPLC (2-column system with switching) with UV detection at 310 nm.		

Plant materials (Schmidt, 1997, AMR 4271-96)

Analyte:	Indoxacarb + R enantiomer	GC-ECD and GC-MS	Method AMR 4271-96
LOQ:	0.01 mg/kg for apple, cabbage, grape, tomato. 0.02 mg/kg for cotton seed.		
Description	AMR 4271-96 is based on multi-residue method DFG S19 with a modified extraction solvent. Samples are extracted with water/acetone/ethyl acetate/cyclohexane. Cotton seed is extracted with acetone/acetonitrile. Extracts are cleaned up by gel permeation chromatography (GPC) and by adsorption chromatography on silica gel. Analytes are determined by capillary GC-ECD on a non-polar stationary phase. Full scan GC-MS is used for identification.		

Animal commodities (Amoo and Beaver-Stetser, 1997, AMR 3337-95)

Analyte:	Indoxacarb + R isomer and IN-JT333	HPLC-UV	Method AMR-2227-95
LOQ:	0.01 mg/kg for whole milk, skim milk, cream, fat, muscle, kidney, liver		
Description	Residues are extracted from aliquots of milk, cream or tissues with acetonitrile (milk, cream, liver and kidney) or ethyl acetate (fat and muscle). Milk and cream extracts are further cleaned up with C_{18} cartridges. Tissue extracts are cleaned up with additional hexane washes, with liver and kidney extracts further cleaned up by silica solid phase extraction. Extracts are evaporated and taken up in HPLC mobile phase (acetonitrile + pH 3.0 phosphate buffer) for analysis, with UV detection at 310 nm. Further cleanup is affected on a 2-column switching system with the first column (cyano) acting as the cleanup system and the second column (ODS) as the analytical column. Once the analytes are transferred to the analytical column, the cyano column is flushed with a solvent prior to injection of the next sample.		

Animal commodities (Linkerhagner and Guinivan, 2001, Du-Pont-2338)

Analyte:	Indoxacarb + R isomer and IN-JT333	GC-ECD	Method DFSG S19
LOQ:	0.01 mg/kg for milk, eggs, bovine muscle, poultry meat. 0.03 mg/kg for fat		
Description	Samples are homogenized with a mixture of water, acetone and sodium chloride. Ethyl acetate and cyclohexane are added and residues are partitioned into the organic phase, which is separated and dried with sodium sulphate. The extract is concentrated to near dryness and the residue is taken up in ethyl acetate and cyclohexane ready for cleanup through a gel permeation column. The selected eluate is collected, concentrated and made to volume with ethyl acetate ready for cleanup through a silica column. Selected fractions are evaporated and the residue is taken up in acetone for GC-ECD analysis on a medium-polarity capillary column. A non-polar column or GC-MSD may be used for confirmation of residue identity. Different conditions and extraction solvent mixtures are chosen to suit different sample types. Matrix effects from some substrates tended to produce high recoveries at low concentrations.		

HPLC method AMR 2712-93 was subjected to independent laboratory validation (ILV) where successful recoveries were obtained for the cotton and maize commodities tested (Lochhaas, 1997, AMR 4625-97). Successful ILV recoveries were obtained in GC-MSD method AMR 3493-95 for spinach leaves and tomatoes at concentrations relevant for enforcement purposes (Lyle and James, 1997, AMR 4623-97). Independent laboratory validation of GC-ECD method AMR 4271-96, based on multiresidue method DFG S19, was carried out with numerous recoveries on apples, cabbage, cotton seed, grapes and tomatoes (Class, 2000, DuPont-3295).

GC-ECD method DuPont-2338, a modification of multiresidue method DFG S19, was subjected to independent laboratory validation (ILV) where acceptable recoveries were obtained for indoxacarb and metabolite IN-JT333 in the animal commodities tested - liver and kidney (Class, 2001, Du-Pont-6224) and milk, bovine muscle, bovine fat and whole egg (Class, 2001, DuPont-3520).

Recoveries were more variable for analyses on a second column used for confirmation of residue identity.

Column-switching HPLC method AMR 3337-95 for residues of indoxacarb and metabolite IN-JT333 in animal commodities was subjected to independent laboratory validation (Miller and James, 1997, AMR 4624-97). Satisfactory recoveries at 0.01 and 0.02 mg/kg in whole milk and ground beef were achieved after slight modifications to the method. Improved recoveries were achieved when extra care was taken to ensure the residue was all redissolved after an evaporation step.

Recovery data from the independent laboratory validation (ILV) testing are summarised in Table 11.

Table 11. Analytical recoveries for spiked indoxacarb in various substrates.

Commodity	Spiked analyte	Spike conc, mg/kg	n	Mean recov%	Range recov%	Method	Ref
Apple	racemic indoxacarb	0.2-0.6	5	93	86-113	AMR 3493-95	AMR 3493-95
Apple	racemic indoxacarb	0.02	4	84	76-96	AMR 3493-95	AMR 3493-95
Apple	racemic indoxacarb	0.05, 0.25	8	101	88-122	AMR 3493-95	AMR 3493-95
Apple	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	94	91-102	DFG S19 modified	AMR 4271-96
Apple	indoxacarb 3S+1R	0.01	5	93	78-105	AMR 4271-96	DuPont-3295
Apple	indoxacarb 3S+1R	0.1	5	94	78-107	AMR 4271-96	DuPont-3295
Apple	indoxacarb 3S+1R	0.01, 0.1	2		105, 94	AMR 4271-96-GCMS	DuPont-3295
Apple juice	racemic indoxacarb	0.3-1.0	6	110	94-118	AMR 3493-95	AMR 3493-95
Apple juice	racemic indoxacarb	0.02	4	88	72-100	AMR 3493-95	AMR 3493-95
Apple juice	racemic indoxacarb	0.05, 0.25	8	89	78-106	AMR 3493-95	AMR 3493-95
Apple pomace, wet	racemic indoxacarb	0.3-1.0	6	87	75-99	AMR 3493-95	AMR 3493-95
Apple pomace, wet	racemic indoxacarb	0.02	4	85	76-89	AMR 3493-95	AMR 3493-95
Apple pomace, wet	racemic indoxacarb	0.05, 0.25	8	98	89-107	AMR 3493-95	AMR 3493-95
Apple sauce	racemic indoxacarb	0.2-0.6	5	80	74-99	AMR 3493-95	AMR 3493-95
Apple sauce	racemic indoxacarb	0.02	6	85	73-106	AMR 3493-95	AMR 3493-95
Apple sauce	racemic indoxacarb	0.05, 0.25	12	87	61-108	AMR 3493-95	AMR 3493-95
Beef	indoxacarb 3S+1R	0.01, 0.10	10	77	71-86	DuPont-2338 1/	DuPont-2338
Beef	IN-JT333	0.01, 0.10	10	90	79-103	DuPont-2338 1/	DuPont-2338
Beef, ground	indoxacarb 3S+1R	0.01, 0.02	4	108	100-113	AMR 3337-95	AMR 4624-97
Beef, ground	IN-JT333	0.01, 0.02	4	85	82-89	AMR 3337-95	AMR 4624-97
Broccoli	racemic indoxacarb	0.2-0.6	10	98	67-105	AMR 3493-95	AMR 3493-95
Broccoli	racemic indoxacarb	0.02	4	90	77-102	AMR 3493-95	AMR 3493-95
Broccoli	racemic indoxacarb	0.05, 0.25	8	103	96-113	AMR 3493-95	AMR 3493-95
Cabbage	racemic indoxacarb	0.2-0.6	5	112	105-119	AMR 3493-95	AMR 3493-95
Cabbage	racemic indoxacarb	0.02	4	110	101-125	AMR 3493-95	AMR 3493-95
Cabbage	racemic indoxacarb	0.05, 0.25	8	102	71-133	AMR 3493-95	AMR 3493-95
Cabbage	indoxacarb 3S+1R	0.01	5	94	71-105	AMR 4271-96	DuPont-3295
Cabbage	indoxacarb 3S+1R	0.1	6	79	69-93	AMR 4271-96	DuPont-3295
Cabbage	indoxacarb 3S+1R	0.01, 0.1	2		86, 62	AMR 4271-96-GCMS	DuPont-3295
Cabbage, white	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	87	80-92	DFG S19 modified	AMR 4271-96
Cauliflower	racemic indoxacarb	0.2-0.6	5	89	76-108	AMR 3493-95	AMR 3493-95
Cauliflower	racemic indoxacarb	0.02	6	91	73-109	AMR 3493-95	AMR 3493-95
Cauliflower	racemic indoxacarb	0.05, 0.25	12	98	76-113	AMR 3493-95	AMR 3493-95
Cauliflower	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	87	83-93	DFG S19 modified	AMR 4271-96
Cotton forage	indoxacarb + R isomer	0.01	2		77, 91	AMR 2712-93	AMR 2712-93
Cotton forage	indoxacarb + R isomer	0.02, 0.05	7	86	70-108	AMR 2712-93	AMR 2712-93
Cotton gin trash	indoxacarb + R isomer	0.02-0.25	14	84	69-110	AMR 2712-93	AMR 2712-93
Cotton gin trash	indoxacarb + R isomer	0.01	3	91	70-125	AMR 2712-93	AMR 2712-93
Cotton gin trash	indoxacarb 3S+1R	0.05, 20	4	84	75-88	AMR 2712-93	AMR 4625-97
Cotton hulls	indoxacarb + R isomer	0.01	3	79	71-83	AMR 2712-93	AMR 2712-93
Cotton hulls	indoxacarb + R isomer	0.02, 0.05	8	86	78-94	AMR 2712-93	AMR 2712-93
Cotton meal	indoxacarb + R isomer	0.01	3	88	82-98	AMR 2712-93	AMR 2712-93

Commodity	Spiked analyte	Spike conc, mg/kg	n	Mean recov%	Range recov%	Method	Ref
Cotton meal	indoxacarb + R	0.02, 0.05	6	83	73-92	AMR 2712-93	AMR 2712-93
Cotton oil, ref	indoxacarb + R	0.01	3	84	81-89	AMR 2712-93	AMR 2712-93
Cotton oil, ref	indoxacarb + R	0.02, 0.05	6	82	78-87	AMR 2712-93	AMR 2712-93
Cotton seed	indoxacarb + R	0.01	6	107	97-118	AMR 2712-93	AMR 2712-93
Cotton seed	indoxacarb + R	0.02, 0.05	12	103	66-142	AMR 2712-93	AMR 2712-93
Cotton seed	racemic indoxacarb	0.02	5	105	78-118	AMR 3493-95	AMR 3493-95
Cotton seed	racemic indoxacarb	0.05, 0.25	12	95	72-128	AMR 3493-95	AMR 3493-95
Cotton seed	indoxacarb 3S+1R	0.01, 3.0	4	98	88-117	AMR 2712-93	AMR 4625-97
Cotton seed	indoxacarb 3S+1R	0.02	5	128	117-144	AMR 4271-96	DuPont-3295
Cotton seed	indoxacarb 3S+1R	0.2	5	101	81-114	AMR 4271-96	DuPont-3295
Cotton seed	indoxacarb 3S+1R	0.02, 0.2	2		83, 78	AMR 4271-96-GCMS	DuPont-3295
Cream	indoxacarb + R	0.01-5.0	15	91	76-105	AMR 3337-95	AMR 3337-95
Cream	IN-JT333	0.01-5.0	15	81	72-96	AMR 3337-95	AMR 3337-95
Egg	indoxacarb 3S+1R	0.01, 0.10	10	89	77-101	DuPont-2338 1/	DuPont-2338
Egg	IN-JT333	0.01, 0.10	10	89	77-101	DuPont-2338 1/	DuPont-2338
Egg	indoxacarb 3S+1R	0.01, 0.10	15	94	51-125	DuPont-2338 1/	DuPont-3520
Egg	IN-JT333	0.01, 0.10	15	85	43-113	DuPont-2338 1/	DuPont-3520
Fat	indoxacarb + R	0.01-5.0	14	90	76-108	AMR 3337-95	AMR 3337-95
Fat	IN-JT333	0.01-5.0	14	81	70-95	AMR 3337-95	AMR 3337-95
Fat	indoxacarb 3S+1R	0.01, 0.10	10	92	74-107	DuPont-2338 1/	DuPont-2338
Fat	IN-JT333	0.01, 0.10	10	131	76-180	DuPont-2338 1/	DuPont-2338
Fat, bovine	indoxacarb 3S+1R	0.01, 0.10	15	100	76-134	DuPont-2338 1/	DuPont-3520
Fat, bovine	IN-JT333	0.01, 0.10	15	77	44-106	DuPont-2338 1/	DuPont-3520
Grape juice	racemic indoxacarb	0.2-0.6	5	94	71-102	AMR 3493-95	AMR 3493-95
Grape juice	racemic indoxacarb	0.02	6	84	73-100	AMR 3493-95	AMR 3493-95
Grape juice	racemic indoxacarb	0.05, 0.25	11	87	73-99	AMR 3493-95	AMR 3493-95
Grape pomace, dry	racemic indoxacarb	0.02	4	106	82-119	AMR 3493-95	AMR 3493-95
Grape pomace, dry	racemic indoxacarb	0.05, 0.25	8	104	87-115	AMR 3493-95	AMR 3493-95
Grape pomace, wet	racemic indoxacarb	0.2-0.6	5	98	93-101	AMR 3493-95	AMR 3493-95
Grape pomace, wet	racemic indoxacarb	0.02	6	97	78-110	AMR 3493-95	AMR 3493-95
Grape pomace, wet	racemic indoxacarb	0.05, 0.25	12	99	78-113	AMR 3493-95	AMR 3493-95
Grapes	racemic indoxacarb	0.2-0.6	5	92	65-117	AMR 3493-95	AMR 3493-95
Grapes	racemic indoxacarb	0.02	3	102	90-118	AMR 3493-95	AMR 3493-95
Grapes	racemic indoxacarb	0.05, 0.25	8	82	71-98	AMR 3493-95	AMR 3493-95
Grapes	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	95	90-102	DFG S19 modified	AMR 4271-96
Grapes	indoxacarb 3S+1R	0.01	5	96	75-110	AMR 4271-96	DuPont-3295
Grapes	indoxacarb 3S+1R	0.1	4	98	80-105	AMR 4271-96	DuPont-3295
Grapes	indoxacarb 3S+1R	0.01, 0.1	2		100, 88	AMR 4271-96-GCMS	DuPont-3295
Kidney	indoxacarb + R	0.01-5.0	14	92	78-105	AMR 3337-95	AMR 3337-95
Kidney	IN-JT333	0.01-5.0	14	82	72-92	AMR 3337-95	AMR 3337-95
Kidney	indoxacarb 3S+1R	0.01, 0.10	10	81	70-87	DuPont-2338 1/	DuPont-6224
Kidney	IN-JT333	0.01, 0.10	10	86	71-97	DuPont-2338 1/	DuPont-6224
Lettuce	racemic indoxacarb	0.2-0.6	5	101	93-110	AMR 3493-95	AMR 3493-95
Lettuce	racemic indoxacarb	0.02	6	99	76-127	AMR 3493-95	AMR 3493-95
Lettuce	racemic indoxacarb	0.05, 0.25	12	98	86-117	AMR 3493-95	AMR 3493-95
Liver	indoxacarb + R	0.01-5.0	14	90	70-109	AMR 3337-95	AMR 3337-95
Liver	IN-JT333	0.01-5.0	14	89	80-106	AMR 3337-95	AMR 3337-95
Liver	indoxacarb 3S+1R	0.01, 0.10	11	81	54-92	DuPont-2338 1/	DuPont-6224
Liver	IN-JT333	0.01, 0.10	11	84	58-101	DuPont-2338 1/	DuPont-6224
Maize fodder	indoxacarb + R	0.02-0.25	20	91	73-104	AMR 2712-93	AMR 2712-93
Maize fodder	indoxacarb + R	0.01	6	97	91-111	AMR 2712-93	AMR 2712-93
Maize forage	indoxacarb + R	0.01	5	88	82-94	AMR 2712-93	AMR 2712-93
Maize forage	indoxacarb + R	0.02, 0.05	9	90	82-97	AMR 2712-93	AMR 2712-93
Maize forage	indoxacarb 3S+1R	0.01, 10	4	91	72-110	AMR 2712-93	AMR 4625-97
Milk	indoxacarb 3S+1R	0.01, 0.10	10	105	97-116	DuPont-2338 1/	DuPont-2338
Milk	IN-JT333	0.01, 0.10	10	131	106-139	DuPont-2338 1/	DuPont-2338
Milk	indoxacarb 3S+1R	0.01, 0.10	13	95	64-135	DuPont-2338 1/	DuPont-3520
Milk	IN-JT333	0.01, 0.10	13	95	65-134	DuPont-2338 1/	DuPont-3520

Commodity	Spiked analyte	Spike conc, mg/kg	n	Mean recov%	Range recov%	Method	Ref
Milk, skim	indoxacarb + R	0.01-5.0	14	88	74-109	AMR 3337-95	AMR 3337-95
Milk, skim	IN-JT333	0.01-5.0	14	83	70-96	AMR 3337-95	AMR 3337-95
Milk, whole	indoxacarb + R	0.01-5.0	14	82	72-95	AMR 3337-95	AMR 3337-95
Milk, whole	IN-JT333	0.01-5.0	14	79	66-85	AMR 3337-95	AMR 3337-95
Milk, whole	indoxacarb 3S+1R	0.01, 0.02	4	81	76-85	AMR 3337-95	AMR 4624-97
Milk, whole	IN-JT333	0.01, 0.02	4	81	69-93	AMR 3337-95	AMR 4624-97
Muscle	indoxacarb + R	0.01-5.0	14	87	70-108	AMR 3337-95	AMR 3337-95
Muscle	IN-JT333	0.01-5.0	14	84	72--96	AMR 3337-95	AMR 3337-95
Muscle, bovine	indoxacarb 3S+1R	0.01, 0.10	13	78	65-109	DuPont-2338 1/	DuPont-3520
Muscle, bovine	IN-JT333	0.01, 0.10	13	85	62-115	DuPont-2338 1/	DuPont-3520
Peach	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	94	90-97	DFG S19 modified	AMR 4271-96
Pear	racemic indoxacarb	0.2-0.6	5	79	76-84	AMR 3493-95	AMR 3493-95
Pear	racemic indoxacarb	0.02	4	89	72-112	AMR 3493-95	AMR 3493-95
Pear	racemic indoxacarb	0.05, 0.25	8	102	87-117	AMR 3493-95	AMR 3493-95
Peppers	racemic indoxacarb	0.2-0.6	5	98	84-108	AMR 3493-95	AMR 3493-95
Peppers	racemic indoxacarb	0.01, 0.02	5	99	90-107	AMR 3493-95	AMR 3493-95
Peppers	racemic indoxacarb	0.05, 0.25, 0.5	12	95	71-114	AMR 3493-95	AMR 3493-95
Poultry meat	indoxacarb 3S+1R	0.01, 0.10	6	75	70-81	DuPont-2338 1/	DuPont-2338
Poultry meat	IN-JT333	0.01, 0.10	6	76	65-88	DuPont-2338 1/	DuPont-2338
Raisins	racemic indoxacarb	0.2-0.6	5	105	91-119	AMR 3493-95	AMR 3493-95
Raisins	racemic indoxacarb	0.02	4	87	79-93	AMR 3493-95	AMR 3493-95
Raisins	racemic indoxacarb	0.05, 0.25	8	85	73-102	AMR 3493-95	AMR 3493-95
Spinach leaves	indoxacarb 3S+1R	0.5, 1.0, 5.0	6	109	84-121	AMR 3493-95	AMR 4623-97
Sweet corn k+c	indoxacarb + R	0.01	5	102	94-114	AMR 2712-93	AMR 2712-93
Sweet corn k+c	indoxacarb + R	0.02, 0.05	10	99	88-111	AMR 2712-93	AMR 2712-93
Sweet corn k+c	indoxacarb 3S+1R	0.01, 0.02	4	82	80-83	AMR 2712-93	AMR 4625-97
Tomato	racemic indoxacarb	0.2-0.6	4	109	101-118	AMR 3493-95	AMR 3493-95
Tomato	racemic indoxacarb	0.02	4	91	69-108	AMR 3493-95	AMR 3493-95
Tomato	racemic indoxacarb	0.05, 0.25	8	89	74-108	AMR 3493-95	AMR 3493-95
Tomato	indoxacarb 3S+1R	0.02, 0.2, 0.5	6	85	80-90	DFG S19 modified	AMR 4271-96
Tomato	indoxacarb 3S+1R	0.3, 0.6	4	100	89-111	AMR 3493-95	AMR 4623-97
Tomato	indoxacarb 3S+1R	0.01	5	98	88-108	AMR 4271-96	DuPont-3295
Tomato	indoxacarb 3S+1R	0.1	5	93	78-105	AMR 4271-96	DuPont-3295
Tomato	indoxacarb 3S+1R	0.01, 0.1	2		85, 98	AMR 4271-96-GCMS	DuPont-3295
Tomato juice	racemic indoxacarb	0.2-0.6	5	98	75-111	AMR 3493-95	AMR 3493-95
Tomato juice	racemic indoxacarb	0.02	3	96	81-114	AMR 3493-95	AMR 3493-95
Tomato juice	racemic indoxacarb	0.05, 0.25	8	90	76-105	AMR 3493-95	AMR 3493-95
Tomato ketchup	racemic indoxacarb	0.3-0.6	4	87	73-104	AMR 3493-95	AMR 3493-95
Tomato ketchup	racemic indoxacarb	0.02	4	101	85-111	AMR 3493-95	AMR 3493-95
Tomato ketchup	racemic indoxacarb	0.05, 0.25	8	109	83-119	AMR 3493-95	AMR 3493-95
Tomato paste	racemic indoxacarb	0.02	8	102	84-120	AMR 3493-95	AMR 3493-95
Tomato paste	racemic indoxacarb	0.05, 0.25	16	95	77-109	AMR 3493-95	AMR 3493-95
Tomato paste	racemic indoxacarb	0.2, 0.5, 1.0	6	99	83-110	AMR 3493-95	AMR 3493-95
Tomato puree	racemic indoxacarb	0.3-0.6	4	91	80-102	AMR 3493-95	AMR 3493-95
Tomato puree	racemic indoxacarb	0.02	4	92	76-109	AMR 3493-95	AMR 3493-95
Tomato puree	racemic indoxacarb	0.05, 0.25	8	93	74-103	AMR 3493-95	AMR 3493-95
Wine	racemic indoxacarb	0.2-0.6	5	94	81-107	AMR 3493-95	AMR 3493-95
Wine	racemic indoxacarb	0.02	4	103	83-116	AMR 3493-95	AMR 3493-95
Wine	racemic indoxacarb	0.05, 0.25	8	98	84-113	AMR 3493-95	AMR 3493-95

1/ Based on multi-residue method DFG S19

Extraction efficiency of analytical methods

Plant metabolism studies have shown that parent indoxacarb isomers are the only isomers of interest in plant tissues. Studies were designed to test the extraction efficiencies of the solvent systems used in the analytical methods.

In a series of studies in 1995, confined crops were treated with radiolabelled racemic indoxacarb and commodity was harvested at suitable intervals to produce aged residues. Extraction efficiency of incurred residue was tested by measuring the % of the TRR extracted from the crop matrix (Table 12).

In a second series of studies in 1997, radiolabelled indoxacarb 3S+1R was topically applied to samples of agricultural commodities, which were aged uncapped at room temperature for 2-3 days. Extraction efficiency of residue was then tested by measuring the % of applied ^{14}C that was extracted from the sample (Table 13).

Two extraction procedures were used:

1. *Ethyl acetate - water*. Homogenized sample was further homogenized with a mixture of distilled water and ethyl acetate (5 g sample, 20 ml water, 150 ml ethyl acetate), then the mixture was centrifuged. The ethyl acetate solution was removed and evaporated to dryness, and the residue taken up in acetonitrile for ^{14}C measurement.

2. *Acetonitrile - hexane*. Homogenized sample was soaked in a mixture of acetonitrile and hexane (10 g sample, 100 ml saturated acetonitrile, 50 ml saturated hexane) then further homogenized and centrifuged. The organic layer was separated and the hexane discarded. The pellet was re-extracted and extracts were combined. The acetonitrile was evaporated to a small volume for ^{14}C measurement.

Table 12. Extraction efficiency of aged incurred ^{14}C residues from raw agricultural commodities resulting from the treatment of confined crops with [trifluoromethoxyphenyl (U) ^{14}C] racemic indoxacarb.

Crop	Applic rate kg/ha	PHI, days	Commodity	Solvent	% extracted TRR range	mean	n	Ref
Corn	0.60	7	maize fodder 1/	acetonitrile - hexane	87-95	92	5	AMR 3320-95
Corn	0.60	7	maize fodder 1/	ethyl acetate - water	89-96	93	5	AMR 3320-95
Corn	0.60	7	maize forage	acetonitrile - hexane	75-81	78	5	AMR 3320-95
Corn	0.60	7	maize forage	ethyl acetate - water	89-100	94	5	AMR 3320-95
Corn	0.60	7	sweet corn 2/	acetonitrile - hexane	76-86	80	5	AMR 3320-95
Corn	0.60	7	sweet corn 2/	ethyl acetate - water	89-116	103	5	AMR 3320-95
Lettuce	0.62 3/	7	lettuce	acetonitrile - hexane	96-97	96.5	5	AMR 3315-95
Lettuce	0.62 3/	7	lettuce	ethyl acetate - water	82-91	87	5	AMR 3315-95
Potato	0.60	7	tuber	acetonitrile - hexane	84-116	93	5	AMR 3457-95
Potato	0.60	7	tuber	ethyl acetate - water	83-96	91	5	AMR 3457-95

1/ Maize fodder. Samples were cut at day 7 after treatment and allowed to dry in the field until day 21.

2/ Sweet corn. Kernels + cobs with husks removed.

3/ Lettuce. Four applications at weekly intervals for a total of 2.5 kg/ha of racemic indoxacarb.

Table 13. Extraction efficiency of ^{14}C residues from samples of raw agricultural commodities following topical application of [trifluoromethoxyphenyl (U) ^{14}C] indoxacarb 3S+1R and storage at room temperature.

Commodity	Storage at room temp	Solvent	% recovery of applied ^{14}C range	mean	n	Ref
Cotton gin trash	3 days	acetonitrile - hexane	75-79	78	5	AMR 4594-97
Cotton gin trash	3 days	ethyl acetate - water	72-86	81	5	AMR 4594-97
Cotton seed, with lint	3 days	acetonitrile - hexane	80-90	83	5	AMR 4594-97
Cotton seed, with lint	3 days	ethyl acetate - water	81-91	85	5	AMR 4594-97

Commodity	Storage at room temp	Solvent	% recovery of applied ^{14}C range	mean	n	Ref
Grapes	48 hours	acetonitrile - hexane	74-81	78	5	AMR 4657-97
Grapes	48 hours	ethyl acetate - water	76-83	79	5	AMR 4657-97
Tomato	48 hours	acetonitrile - hexane	73-85	81	5	AMR 4633-97
Tomato	48 hours	ethyl acetate - water	76-86	81	5	AMR 4633-97

The extraction efficiency of ethyl acetate and acetonitrile were tested on samples of milk, cream and tissues from the dairy cow metabolism study (Amoo and Beaver-Stetser, 1997, AMR 3337-95).

Extraction efficiencies of 99, 101, 102 and 105% ^{14}C were achieved with acetonitrile on whole milk. Extraction efficiencies of 88 and 96% ^{14}C were achieved with ethyl acetate on muscle and 123 and 127% on fat.

Extraction efficiencies of 49 and 52% ^{14}C were achieved with acetonitrile on liver.

Stability of residues in stored analytical samples

The Meeting received information on the stability of residues of racemic indoxacarb and indoxacarb 3S+1R in alfalfa, apple juice, apple pomace, apples, fat, grape pomace, grapes, lettuce, liver, milk, muscle, peanut hay, peanut kernels, peanut meal, peanut oil, sweet corn, sweet corn forage, sweet corn stover, tomatoes and wine.

Storage stability data are recorded in the tables unadjusted for concurrent procedural recoveries. If the concurrent procedural recoveries were outside of the 70–120% range the data from that sampling occasion was not taken into account.

Klemens (1997, AMR 3291-95) fortified aliquots (approximately 10g) of sweet corn commodities with racemic indoxacarb for freezer storage stability testing at approximately -18°C. After each storage interval, two aged aliquots and two freshly fortified aliquots acting as procedural recoveries were analysed (Table 14).

Table 14. Freezer storage stability data for indoxacarb (racemic) spiked into sweet corn (kernels + cob with husk removed, K+CWHR) and sweet corn forage and stover (Klemens, 1997, AMR 3291-95).

Months stored	Procedural recov %	Conc., mg/kg	Months stored	Procedural recov %	Conc., mg/kg	Months stored	Procedural recov %	Conc., mg/kg
K+CWHR			Sweet corn forage			Sweet corn stover		
0	88 89	0.092 0.082	0	85 86	0.086 0.082	0	109 95	0.49 0.49
1	95 93	0.096 0.090	1	74 64 1/	0.079 0.078	1	92 99	0.38 0.30
3	86 79	0.090 0.090	3	100 110	0.098 0.096	1 repeat	105 79	0.35 0.30
6	80 85	0.079 0.079	6	80 112	0.098 0.10	3	85 77	0.39 0.40
9	75 76	0.068 0.069				4	94 91	0.28 0.36

1/ Mean procedural recovery <70%.

Guinivan and McVicker (2000, AMR 4349-97) measured the stability of indoxacarb 3S+1R spiked in peanut kernels and peanut hay and stored at -15 ± 6°C. Desmond and Guinivan (2000, AMR 4551-97) measured the stability of indoxacarb 3S+1R spiked in peanut oil and meal and stored at -20 ± 5˚C.

Table 15. Freezer storage stability data for indoxacarb 3S+1R spiked into peanut commodities.

Months stored	Procedural recov %	Conc., mg/kg	Months stored	Procedural recov %	Conc., mg/kg	Ref
Peanut kernel			Peanut hay			
0	94 96 95 94	0.10 nominal	0	93 89 91 92	0.10 nominal	AMR 4349-97
11	71 70	0.071 0.072	11	77 72	0.074 0.084	
Peanut oil			Peanut meal			
0	82 80 82 87	0.10 nominal	0	94 104 104 93	0.10 nominal	AMR 4551-97
1	81 79	0.086 0.087	1	94 87	0.093 0.092	
3	93 87	0.088 0.084	3	94 102	0.094 0.094	
6	84 88	0.087 0.076	6	124 111	0.11 0.10	

Desmond (1997, AMR 3778-96) spiked chopped matrices with racemic indoxacarb at 0.20 mg/kg and stored 5g aliquots in glass jars in a freezer at -20 ± 5°C for intervals. Freshly spiked samples were analysed as procedural recoveries on each sampling occasion. Samples of apple pomace, lettuce and tomatoes with incurred residues from residue trials were stored and periodically analysed to check the stability of incurred residues (Table 16).

Table 16. Freezer storage stability data for indoxacarb (racemic) spiked into crop and processed commodities or present as incurred residues stored at -20 ± 5°C (Desmond, 1997, AMR 3778-96).

Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg
Grapes			Grape wet pomace			Wine		
0	109 92 101	0.20 nominal	0	103 115 105	0.20 nominal	0	93 120 106	0.20 nominal
1	82	0.18 0.18	1	104	0.18 0.21	1	100	0.17 0.19
7	114	0.17 0.16	7	100	0.21 0.20	7	101	0.18 0.20
15	68 1/	0.13 0.17	15	103	0.20 0.22	15	105	0.19 0.19
32	64 1/	0.11 0.14	36	104	0.18 0.21	36	100	0.17 0.21
78	83	0.11 0.15	63	88	0.21 0.21	63	91	0.17 0.16
193	89	0.16 0.13	90	106	0.20 0.19	90	88	0.16 0.16
362	88	0.15 0.14	301	116	0.22 0.23	301	120	0.17 0.10
417	100	0.16 0.14						
418	94	0.18 0.18						
458	93	0.15 0.19						
553	106	0.15 0.21						
Apples			Apple pomace, wet, incurred residues			Apple juice		
0	68 66 80	0.20 nominal	0	106 78	2.7 2.3	0	86 88 108	0.20 nominal
1	90	0.16 0.70	9	90 84	2.5 2.1	36	95	0.18 0.21
7	76	0.14 0.14	52	96 97	2.9	63	111	0.19 0.22
22	69 1/	0.18 0.18	111	84 95	2.7	186	94	0.18 0.17
30	69 1/	0.12 0.14	202	81 83	2.3			
148	99	0.19 0.20						
172	75	0.20 0.20						
379	94	0.21 0.20						
441	96	0.18 0.19						
530	84	0.17 0.15						
Lettuce (glass jars)			Lettuce (polypropylene bottles)			Lettuce, incurred residues		
0	80 73 101	0.20 nominal	0	93 103 98	0.20 nominal	0	80 76	6.0
1	97	0.20 0.16	1	84	0.18 0.18	36	88	4.9
6	65 1/	0.13 0.17	7	92	0.18 0.18	91	103	8.3
11	97	0.15 0.17	50	89	0.13 0.17	183	110	8.1
117	91	0.18 0.15	59	87	0.14 0.14	365	96	5.3
340	75	0.16 0.13	99	82	0.16 0.13			
			321	99	0.15 0.13			

Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg
Tomatoes			Tomatoes, incurred residues					
0	80 75 77	0.20 nominal	0	85	0.21			
1	63 1/	0.17 0.17	29	110	0.22			
7	102	0.19 0.21	90	110	0.21			
65	110	0.20 0.24	182	90	0.22			
107	91	0.16 0.17	365	100	0.16			
206	90	0.20 0.20						
272	95	0.20 0.16						
366	91	0.14 0.14						

1/ Mean procedural recovery < 70%.

Table 17. Freezer storage stability data for indoxacarb 3S+1R residues in alfalfa from spiking or present as incurred residues and stored at -20 ± 10°C (Jin, 2000, AMR 4350-97).

Months stored	Procedural recov %	Conc., mg/kg	Months stored	Procedural recov %	Conc., mg/kg	Months stored	Procedural recov %	Conc., mg/kg
Alfalfa forage			Alfalfa forage, incurred residue					
0	80 80 83 78	0.10 nominal	0		2.1			
1	84 86	0.061	5		2.5 1.6 1.9 2.2 2.3			
2	90 72	0.060 0.060						
6	97 87	0.084 0.071	17		2.8 2.4 2.4 1.9 2.3			
Alfalfa hay			Alfalfa hay, incurred residue			Alfalfa hay, incurred residue		
0	98 70 88 83	0.10 nominal	0		8.8	0		3.4
1	97 95	0.11 0.10	20		8.7 8.4 9.6 9.5 8.7	20		3.1 3.0 3.6 3.4 2.9
6	80 89	0.092 0.078						

Amoo (1997, AMR 3820-96) measured the freezer storage stability of indoxacarb 3S+1R spiked at 0.10 mg/kg into milk, muscle, fat and liver and incurred residues in milk and fat stored at -20 ± 10°C for 60–90 days (Table 18 and Table 19). Residues were stable for the storage intervals tested. The storage stability of metabolite IN-JT333 in the same matrices for the same intervals was also tested. Residues of IN-JT333 were also stable for the storage intervals tested.

Table 18. Freezer storage stability data for indoxacarb 3S+1R spiked into animal commodities (Amoo, 1997, AMR 3820-96) and stored at -20 ± 10°C.

Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg
Whole milk			Dairy cow muscle		
0	86 74	0.10 nominal	0	102 93 95 97	0.10 nominal
15	70 78	0.078 0.071	15	103 104	0.112 0.110
30	92 96	0.099 0.091	32	99 97	0.111 0.104
60	101 100	0.099 0.091	82	83 77	0.077 0.076
Dairy cow fat			Dairy cow liver		
0	96 96 97 97	0.10 nominal	0	95 94 95 95	0.10 nominal
15	94 95	0.091 0.095	15	105 100	0.096 0.089
30	98 104	0.115 0.120	35	104 96	0.11 0.11
90	77 79	0.085 0.090	90	90 86	0.089 0.092

Table 19. Freezer storage stability data for incurred residues of indoxacarb + R enantiomer in animal commodities (Amoo, 1997, AMR 3820-96) and stored at -20 ± 10°C.

Days stored	Procedural recov %	Conc., mg/kg	Days stored	Procedural recov %	Conc., mg/kg
Whole milk			Dairy cow fat		
0		0.20	0	96 96	0.25 0.23 0.28 0.28 0.25 0.24
26	98 101	0.18 0.19 0.19 0.18 0.18 0.19	15	94 95	0.24 0.24
55	100	0.15 0.15	30	98 104	0.29 0.31
77	88	0.14 0.17	90	77 79	0.22 0.22

USE PATTERN

Indoxacarb is a broad-spectrum lepidoptera insect control agent that also demonstrates activity on other select pests (DuPont, 2005, DuPont-15063). The major insect species controlled by indoxacarb include many lepidopteran pests such as budworm, armyworm, diamondback moth, loopers, codling moth, grape berry moth, and certain leafrollers. In addition to control of these and numerous other lepidopteran species, indoxacarb also controls a range of further insect pests including Colorado potato beetle, cranberry weevil, leafhoppers, sawflies, and tarnished plant bug.

Indoxacarb is registered for use against a large number of insect pests on a wide range of crops in many countries. Labels and English translations were available for all the uses. Information on registered uses included in this monograph is generally limited to countries where supervised trials had been conducted, and is summarized in Table 20.

Table 20. Registered uses of indoxacarb.

Crop	Country	Field 1/	Application Form	Type	Rate kg ai/ha	Conc kg ai/hL	Max number	PHI days
Alfalfa	USA	F	SC 150 g/L	foliar, aerial	0.073-0.12		1 per cutting	7
Apple	Australia	F	WG 300 g/kg	foliar		0.0075	6	14
Apple	Belgium	F	WG 300 g/kg	foliar	0.075		2	7
Apple	Greece	F	WG 300 g/kg	foliar	0.05-0.1	0.005	3	7
Apple	Hungary	F	WG 300 g/kg	foliar	0.051		4	7
Apple	Italy	F	WG 300 g/kg	foliar	0.075	0.005	4	7
Apple	Netherlands	F	WG 300 g/kg	foliar	0.075	0.0051	4	7
Apple	New Zealand	F	WG 300 g/kg	foliar		0.006	4	5
Apple	South Africa	F	WG 300 g/kg 2/	foliar		0.0075	4	28
Apple	USA	F	WG 300 g/kg	foliar, aerial	0.063-0.12		4 3/	14
Apricot	Australia	F	WG 300 g/kg	foliar		0.0075	3	7
Apricot	Greece	F	WG 300 g/kg	foliar	0.05-0.1	0.005	3	7
Apricot	Hungary	F	WG 300 g/kg	foliar	0.038-0.051		3	7
Apricot	Italy	F	WG 300 g/kg	foliar	0.05	0.005	2	7
Aubergine	Italy	F,P	WG 300 g/kg	foliar	0.026		4	3
Aubergine	Italy	F,P	WG 300 g/kg	foliar	0.038		4	3
Beans	South Africa	F	WG 300 g/kg	foliar	0.038		2	3
Broccoli	Australia	F	WG 300 g/kg	foliar	0.075		4	7
Broccoli	France	F	WG 300 g/kg	foliar	0.026		3	3
Broccoli	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Broccoli	Spain	F	WG 300 g/kg	foliar	0.025		3	3
Broccoli	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Brussels sprouts	Australia	F	WG 300 g/kg	foliar	0.075		4	7

Crop	Country	Field 1/	Application					PHI days
			Form	Type	Rate kg ai/ha	Conc kg ai/hL	Max number	
Brussels sprouts	New Zealand	F	SC 150 g/L	foliar	0.075		4	7
Brussels sprouts	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Brussels sprouts	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Cabbage	Australia	F	WG 300 g/kg	foliar	0.075		4	7
Cabbage	India	F	SC 150 g/L	foliar	0.04	0.0053-0.01		7
Cabbage	Italy	F	WG 300 g/kg	foliar	0.026		3	3
Cabbage	New Zealand	F	SC 150 g/L	foliar	0.075		4	7
Cabbage	Spain	F	WG 300 g/kg	foliar	0.025		3	3
Cabbage, head	France	F	WG 300 g/kg	foliar	0.026		3	3
Cabbage, head	Germany	F	WG 300 g/kg	foliar	0.026		3	3
Cabbage, head	Greece	F	WG 300 g/kg	foliar	0.025	0.0025-0.005	3	1
Cabbage, head	Hungary	F, G	WG 300 g/kg	foliar	0.038-0.051			3
Cabbage, head	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Cabbage, head	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Cabbage, Savoy	Italy	F	WG 300 g/kg	foliar	0.026		3	3
Capsicum	Australia	F	WG 300 g/kg	foliar	0.075		3	3
Cauliflower	Australia	F	WG 300 g/kg	foliar	0.075		4	7
Cauliflower	France	F	WG 300 g/kg	foliar	0.026		3	3
Cauliflower	Germany	F	WG 300 g/kg	foliar	0.026		3	3
Cauliflower	Greece	F	WG 300 g/kg	foliar	0.025	0.0025-0.005	3	1
Cauliflower	Italy	F	WG 300 g/kg	foliar	0.026		3	3
Cauliflower	New Zealand	F	SC 150 g/L	foliar	0.075		4	7
Cauliflower	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Cauliflower	Spain	F	WG 300 g/kg	foliar	0.025		3	3
Cauliflower	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Cherry	Hungary	F	WG 300 g/kg	foliar	0.038-0.051		2	7
Chickpea	Australia	F	SC 150 g/L	foliar, ground	0.045		1	28
Chickpea	Australia	F	SC 150 g/L	foliar, aerial	0.045		1	28
Chicory	Italy	F	WG 300 g/kg	foliar	0.038		3	3
Chinese broccoli	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Chinese cabbage, napa	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Chinese mustard cabbage	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Citrus, non-bearing	South Africa	F	WG 300 g/kg	foliar		0.0038	2	
Coles de China	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Corn	Italy	F	WG 300 g/kg	foliar	0.038		2	14
Corn, grain and silage	Hungary	F	WG 300 g/kg	foliar, chemigation	0.051			NR 5/
Cotton	Australia	F	SC 150 g/L	foliar, ground	0.13		3	28
Cotton	Australia	F	SC 150 g/L	foliar, aerial	0.13		3	28
Cotton	India	F	SC 150 g/L	foliar	0.075	0.0075-0.0125		16
Cotton	South Africa	F	SC 150 g/L	foliar	0.03-0.038		5	7/
Cotton	Spain	F	SC 150 g/L	foliar	0.038		3	14

Crop	Country	Field 1/	Application					PHI
			Form	Type	Rate kg ai/ha	Conc kg ai/hL	Max number	PHI days
Cotton	USA	F	SC 150 g/L	foliar, aerial	0.073-0.12		8/	14
Courgette	Greece	F,G,I	WG 300 g/kg	foliar	0.038	0.0038-0.0075	3	1
Cucumber	Greece	F,G,I	WG 300 g/kg	foliar	0.038	0.0038-0.0075	3	1
Cucumber	Hungary	F, G	WG 300 g/kg	foliar	0.051			1
Cucurbits	Italy	F,P	WG 300 g/kg	foliar	0.038		3	3
Cucurbits	Spain	F,G	WG 300 g/kg	foliar	0.038		6	1
Egg plant	Australia	F	WG 300 g/kg	foliar	0.075		3	3
Egg plant	Italy	F,P	WG 300 g/kg	foliar	0.038		4	3
Egg plant	Spain	F,G	WG 300 g/kg	foliar	0.038		6	1
Egg plant	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Endive	Italy	F	WG 300 g/kg	foliar	0.038		3	3
Grape, table	France	F	SC 150 g/L	foliar	0.038		3	10
Grape, table	France	F	WG 300 g/kg	foliar	0.038		3	10
Grape, table	Greece	F	WG 300 g/kg	foliar	0.023-0.068	0.0045	3	10
Grape, table	Hungary	F	WG 300 g/kg	foliar	0.038		5	3
Grape, table	Italy	F	WG 300 g/kg	foliar	0.038	0.0045	3	10
Grape, wine	France	F	SC 150 g/L	foliar	0.038		3	10
Grape, wine	France	F	WG 300 g/kg	foliar	0.038		3	10
Grape, wine	Germany	F	WG 300 g/kg	foliar	0.056	0.0038	3	14
Grape, wine	Greece	F	WG 300 g/kg	foliar	0.023-0.068	0.0045	3	10
Grape, wine	Hungary	F	WG 300 g/kg	foliar	0.038		5	10
Grape, wine	Italy	F	WG 300 g/kg	foliar		0.0045	3	10
Grapes	Australia	F	WG 300 g/kg	foliar		0.0051	3	56
Grapes	USA	F	WG 300 g/kg	foliar	0.12		4	7
Kale	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Kiwifruit	New Zealand	F	SC 150 g/L	foliar		0.0038	1	9/
Kohlrabi	Germany	F, G	WG 300 g/kg	foliar	0.026		2	7
Kohlrabi	South Africa	F	WG 300 g/kg	foliar	0.038-0.045		5	3
Kohlrabi	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Leafy vegetables 10/	Australia	F	WG 300 g/kg	foliar	0.051		3	3
Lettuce	Greece	F	WG 300 g/kg	foliar	0.038	0.0053-0.0125	3	1
Lettuce	Italy	F	WG 300 g/kg	foliar	0.038		3	3
Lettuce	Spain	F,G	WG 300 g/kg	foliar	0.038		6	1
Lettuce, head	New Zealand	F	SC 150 g/L	foliar	0.075		4	3
Lettuce, head and leaf	USA	F	WG 300 g/kg	foliar, aerial	0.073-0.12		3/	3
Mungbean	Australia	F	SC 150 g/L	foliar, ground	0.06		1	28
Mungbean	Australia	F	SC 150 g/L	foliar, aerial	0.06		1	28
Nectarine	Australia	F	WG 300 g/kg	foliar		0.0075	3	7
Nectarine	Greece	F	WG 300 g/kg	foliar	0.05-0.1	0.005	3	7
Nectarine	Italy	F	WG 300 g/kg	foliar	0.075	0.005	4	7
Peach	Australia	F	WG 300 g/kg	foliar		0.0075	3	7
Peach	Greece	F	WG 300 g/kg	foliar	0.05-0.1	0.005	3	7
Peach	Hungary	F	WG 300 g/kg	foliar	0.038-0.051		3	7
Peach	Italy	F	WG 300 g/kg	foliar	0.075	0.005	4	7
Peanut	USA	F	SC 150 g/L	foliar, aerial	0.1-0.12		8/	14
Pear	Australia	F	WG 300 g/kg	foliar		0.0075	6	14
Pear	Belgium	F	WG 300 g/kg	foliar	0.075		2	7
Pear	Greece	F	WG 300 g/kg	foliar	0.05-0.1	0.005	3	7
Pear	Italy	F	WG 300 g/kg	foliar	0.075	0.005	4	7
Pear	Netherlands	F	WG 300 g/kg	foliar	0.075	0.0051	4	7
Pear	New Zealand	F	WG 300 g/kg	foliar		0.006	4	5
Pear	South Africa	F	WG 300 g/kg	foliar		0.0075	4	28
Pear	USA	F	WG 300 g/kg	foliar, aerial	0.1-0.12		4 3/	28
Peas	South Africa	F	WG 300 g/kg	foliar, aerial only	0.045		2	7

Crop	Country	Field	Application					
		1/	Form	Type	Rate kg ai/ha	Conc kg ai/hL	Max number	PHI days
Peas	South Africa	F	WG 300 g/kg	foliar, ground only	0.038		2	7
Peppers	Australia	F	WG 300 g/kg	foliar	0.075		3	3
Peppers	Greece	F,G,I	WG 300 g/kg	foliar	0.038	0.0038-0.0075	3	1
Peppers	Hungary	F, G	WG 300 g/kg	foliar	0.051			1
Peppers	Italy	F,P	WG 300 g/kg	foliar	0.038		4	3
Peppers	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Peppers, green	Spain	F,G	WG 300 g/kg	foliar	0.038		6	1
Plum	Australia	F	WG 300 g/kg	foliar		0.0075	3	7
Pome fruit	Germany	F	WG 300 g/kg	foliar	0.077		4	7
Potato	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.12		3/	7
Potato, ware	South Africa	F	WG 300 g/kg	foliar, aerial only	0.045		5	0
Potato, ware	South Africa	F	WG 300 g/kg	foliar, ground only	0.038		5	0
Raspberry	Hungary	F	WG 300 g/kg	foliar	0.038-0.051		3	10
Soybean	Australia	F	SC 150 g/L	foliar, ground	0.06		1	28
Soybean	Australia	F	SC 150 g/L	foliar, aerial	0.06		1	28
Soybean	USA	F	SC 150 g/L	foliar, aerial	0.06-0.12		8/	21
Spinach	Greece	F	WG 300 g/kg	foliar	0.038	0.0063-0.0075	3	5
Spinach	Italy	F	WG 300 g/kg	foliar	0.038		3	5
Sunflower	Hungary	F	WG 300 g/kg	foliar	0.051		2	21
Sweet corn	Germany	F	WG 300 g/kg	foliar	0.038		1	7
Sweet corn	Hungary	F	WG 300 g/kg	foliar, chemigation	0.051		5	3
Sweet corn	Italy	F	WG 300 g/kg	foliar	0.038		2	7
Sweet corn	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3 6/
Tomato	Australia	F	WG 300 g/kg	foliar, aerial	0.075		3	3
Tomato	France	F	SC 150 g/L	foliar	0.038		3	3
Tomato	France	F	WG 300 g/kg	foliar	0.038		3	3
Tomato	Greece	F,G,I	WG 300 g/kg	foliar	0.038	0.0038-0.0075	3	1
Tomato	Hungary	F, G	WG 300 g/kg	foliar	0.051			1
Tomato	Italy	F,P	WG 300 g/kg	foliar	0.038		4	3
Tomato	Italy	F,P	WG 300 g/kg	foliar	0.038		4	3
Tomato	South Africa	F	WG 300 g/kg	foliar	0.045	0.0045	5	1
Tomato	Spain	F,G	WG 300 g/kg	foliar	0.038		6	1
Tomato	USA	F	WG 300 g/kg	foliar, aerial	0.05-0.073		4/	3
Watermelon	Greece	F,G,I	WG 300 g/kg	foliar	0.038	0.0038-0.0075	3	1

1/ F: field use. G: greenhouse use. I: indoor. P: plastic tunnel
2/ South Africa: General restraint on WG formulation: Do not graze or use treated crop as fodder
3/ USA, apple, lettuce, pear, potato: Do not apply more than 0.44 lb ai/acre (0.49 kg ai/ha) per crop.
4/ USA, broccoli, Brussels sprouts, cabbage, cauliflower, Chinese broccoli, Chinese cabbage, Chinese mustard cabbage, egg plant, kohlrabi, peppers, sweet corn, tomatoes: Do not apply more than 0.26 lb ai/acre (0.29 kg ai/ha) per crop.
5/ NR: no restriction.
6/ USA, sweet corn. PHI for fodder and stover, 35 days.
7/ South Africa: Do not graze treated cotton.
8/ USA, cotton, peanuts, soybeans: Do not apply more than 0.49 kg ai/ha per crop.
9/ NZ: kiwifruit: Do not apply 7 days after fruit set or when fruit is greater than 10 mm in length.
10/ Australia. Leafy vegetables including: chicory, cress, Chinese leafy vegetables including bok choy, choy sum, Chinese cabbage, etc; endive, fennel kale, lettuce closed head and leafy varieties; mustard silver beet, spinach.

RESIDUES RESULTING FROM SUPERVISED TRIALS

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

Apple: Australia, Belgium, France, Germany, Greece, Hungary, Italy, South Africa and USA	Table 21
Pear: Australia, South Africa and USA	Table 22
Stone fruits: Australia, France, Greece, Italy and Spain	Table 23
Grapes: Australia, France, Germany, Greece, Hungary, Italy, Spain and USA	Table 24
Cabbage: Australia, Belgium, Denmark, France, Germany, Greece, India, Netherlands, Portugal, Italy, South Africa, Spain, UK and USA	Table 25
Broccoli: Australia, France, Italy, South Africa, UK and USA	Table 26
Cauliflower: Australia, Denmark, France, Germany, Greece, Italy, Netherlands, South Africa and Spain	Table 27
Brussels sprouts: Australia	Table 28
Cucumbers and courgettes: France, Greece, Italy and Spain	Table 29
Melons: France, Greece, Italy and Spain	Table 30
Tomatoes: Australia, France, Greece, Italy, Spain and USA	Table 31
Peppers: Australia, France, Greece, Italy, Portugal, Spain and USA	Table 32
Sweet corn: USA	Table 33
Lettuce: France, Greece, Italy , Spain and USA	Table 34
Pulses (adzuki beans, chickpeas and mung beans): Australia	Table 35
Soybeans: Australia and USA	Table 36
Potato: USA	Table 37
Peanuts: USA	Table 38
Cotton seed: India and USA	Table 39
Legume animal feeds: Australia and USA	Table 40
Alfalfa: USA	Table 41
Sweet corn forage: USA	Table 42
Cotton - cotton gin trash: USA	Table 43

Trials were generally well documented with laboratory and field reports. Laboratory reports included method validation with procedural recoveries from spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analyses or duration of residue sample storage were also provided. Although trials included control plots, no control data are recorded in the tables except where residues in control samples exceeded the LOQ. Residue data are recorded unadjusted for recovery.

In most trials, duplicate field samples from an unreplicated plot were taken at each sampling time and were analysed separately. The two analytical results are recorded in the tables. For the purposes of the evaluation, the mean of the two results was taken as the best estimate of the residue from the plot.

When residues were not detected they are shown as below the LOQ (e.g. < 0.02 mg/kg). Residues, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. Residue trials at exaggerated application rates have also been included when residues did not exceed LOQ. Those results included in the evaluation are double underlined.

In some trials the formulation was based on racemic indoxacarb and in others indoxacarb 3S+1R was used. In all situations, the application rate and spray concentration were expressed in terms of the active ingredient, indoxacarb. In all cases residues were measured and expressed as indoxacarb + R enantiomer.

Conditions of the supervised residue trials were generally well reported in detailed field reports. Most trial designs used non-replicated plots. Most field reports provided data on the sprayers used, plot size, residue sample size and sampling date. In multiple applications, the application rate, spray concentration and water volume may not have been exactly the same for all applications; the recorded values in the supervised trials summary tables are for the final application.

Intervals of freezer storage between sampling and analysis were recorded for all trials and were covered by the conditions of the freezer storage stability studies.

In some trials, residues were measured on samples taken just before the final application as well as just after (the "zero day" samples). The samples taken just before the final application are listed in the tables with one fewer application than the final and with a PHI equivalent to the interval between the penultimate and final applications. These samples provide information on the carryover of residue from applications previous to the final.

For apples, the average carryover of residue was 45% (Europe, n=12). For peaches, the average carryover of residue was 38% (Europe, n=6). For grapes, the average carryover of residue was 41% (Australia, n=12) and 44% (Europe, n=20). For cabbages, the average carryover of residue was 44% (Europe, n=6) and 25% (South Africa, n=4). For cauliflower, the average carryover of residue was 27% (Europe, n=7). For broccoli, the average carryover of residue was 23% (Europe, n=6). For lettuce, the average carryover of residue was 26% (Europe, n=6). For melons-peel, the average carryover of residue was 36% (Europe, n=10). For tomatoes, the average carryover of residue was 48% (Europe, n=12). For peppers, the average carryover of residue was 49% (Europe, n=9).

Parallel trials (same place, same application rate, same operator, etc) between products based on racemic indoxacarb and products based on indoxacarb 3S+1R compared the resulting residues on apple, broccoli, cabbage, cauliflower, cotton, lettuce and tomato. Residue levels from the 3S+1R treatments were approximately 50% of those with the racemic treatments. Therefore, supervised residue trials with racemic indoxacarb were not used as GAP trials for MRL evaluation, except for cases like sweet corn where residues were below LOQ.

Processing trials with racemic material were considered valid because the processing factors should not be influenced by higher residues than achieved by GAP. It is common practice to apply a pesticide at exaggerated rates in processing trials to achieve measurable levels in processed commodities.

Table 21. Indoxacarb residues in apples resulting from supervised trials in Australia, Belgium, France, Germany, Greece, Hungary, Italy, South Africa and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

APPLES country, year (variety)	Application 1/ Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
Australia (NSW), 1996 (Red Delicious)	WG 3S+1R		0.009	1600 - 2200	10	3 7 14 21	fruit	0.68 0.63 0.45 0.36	97/5540 6311
Australia (NSW), 1996 (Red Delicious)	WG 3S+1R		0.018	1600 - 2200	10	3 7 14 21	fruit	1.1 0.87 1.1 1.4	97/5540 6311

APPLES country, year (variety)	Application 1/					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Vic), 1997 (Granny Smith)	WG 3S+1R		0.0075	1850-2150	11	0 1 28	fruit	0.20 0.09 0.08	98/2775 7398
Australia (NSW), 1998 (Red Delicious)	WG 3S+1R		0.0075	2000-2900	13	0 7 14 21 28	fruit	1.1 0.86 0.85 0.62 0.58	99/1965 8398
Australia (NSW), 1998 (Red Delicious)	WG 3S+1R		0.015	2000-2900	13	0 7 14 21 28	fruit	1.9 1.9 1.1 1.1 0.86	99/1965 8398
Australia (Qld), 1998 (Granny Smith)	WG 3S+1R		0.0075	1440	6	15 89 117	fruit	0.28 0.08 0.10	99/2056
Australia (Qld), 1998 (Granny Smith)	WG 3S+1R		0.0075	1440	6	0 7 14 21 28	fruit	0.51 0.43 0.50 0.45 0.43	99/2056
Australia (Qld), 1998 (Granny Smith)	WG 3S+1R		0.015	1440	6	0 7 14 21 28	fruit	0.69 < 0.02 0.73 0.63 0.74	99/2056
Belgium, 1998 (Jonagold)	WG 3S+1R	0.055	0.005	1040	4	7	fruit	0.04 0.07 m 0.06	AMR 5008-98
Belgium, 1999 (Jonagold)	WG 3S+1R	0.078	0.005	1630	3 4	11 0 1 3 5 7	fruit	0.09 0.07 0.16 0.13 0.13 0.12 0.12 0.11 0.09 0.09 0.07 0.07 m 0.07	DuPont-2581
Belgium, 2000 (Jonagold)	WG 3S+1R	0.082	0.006	1300	3 4	9 0 1 3 5 7	fruit	0.07 0.09 0.18 0.23 0.13 0.14 0.10 0.13 0.11 0.13 0.09 0.08 m 0.09	DuPont-4355
France, 1999 (Fuji)	WG 3S+1R	0.098	0.008	1180	4	7	fruit	0.07 0.08	DuPont-2581
France, 1999 (Golden)	WG 3S+1R	0.097	0.008	1290	3 4	10 0 1 3 5 7	fruit	0.06 0.06 0.12 0.12 0.09 0.12 0.06 0.08 0.06 0.06 0.05 0.05 m 0.05	DuPont-2581

APPLES country, year (variety)	Application 1/ Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
France, 1999 (Golden)	WG 3S+1R	0.094	0.008	1160	3 4	8 0 1 3 5 7	fruit	0.13 0.12 0.21 0.22 0.17 0.20 0.15 0.17 0.13 0.14 0.10 0.11 m 0.11	DuPont-2581
France, 1999 (Starkrimson)	WG 3S+1R	0.099	0.009	1100	4	7	Fruit	0.07 0.07	DuPont-2581
France, 2000 (Golden)	WG 3S+1R	0.077	0.005	1590	3 4	11 0 1 3 5 7	fruit	0.18 0.18 0.27 0.21 0.20 0.20 0.18 0.18 0.18 0.18 0.13 0.12 m 0.13	DuPont-4355
France, 2000 (Melrose)	WG 3S+1R	0.076	0.006	1210	4	7	fruit	0.13 0.15 m 0.14	DuPont-4355
France, 2000 (Red American)	WG 3S+1R	0.081	0.005	1660	4	7	fruit	0.08 0.08 m 0.08	DuPont-4355
Germany, 1998 (Royal Gala)	WG 3S+1R	0.052	0.005	1050	4	7	fruit	0.07 0.05	AMR 5008-98
Germany, 1999 (Golden Delicious)	WG 3S+1R	0.097	0.008	1260	3 4	10 0 1 3 5 7	fruit	0.12 0.10 0.33 0.36 0.31 0.24 0.23 0.20 0.18 0.20 0.17 0.15 m 0.16	DuPont-2581
Germany, 2000 (Gloster)	WG 3S+1R	0.077	0.005	1500	3 4	10 0 1 3 5 7	fruit	0.07 0.06 0.18 0.18 0.14 0.15 0.13 0.12 0.12 0.10 0.10 0.10 m 0.10	DuPont-4355
Germany, 2000 (Jonagold)	WG 3S+1R	0.082	0.008	1070	4	7	fruit	0.21 0.27 m 0.24	DuPont-4355
Greece, 1998 (Granny Smith)	WG 3S+1R	0.051	0.005	1000	3 4	10 0 1 3 5 7	fruit	< 0.02 0.02 0.09 0.11 0.08 0.07 0.05 0.06 0.04 0.05 0.03 < 0.02	AMR 5008-98
Greece, 1998 (Granny Smith)	WG 3S+1R	0.13	0.005	2500	3 4	10 0 1 3 5 7	fruit	0.05 0.04 0.21 0.23 0.17 0.19 0.14 0.13 0.05 0.06 0.02 0.03 m 0.03	AMR 5113-98

APPLES country, year (variety)	Application 1/					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Greece, 1999 (Granny Smith)	WG 3S+1R	0.080	0.005	1670	4	7	fruit	0.28 0.18 m 0.21	DuPont-2581
Greece, 1999 (Granny Smith)	WG 3S+1R	0.079	0.005	1640	3 4	9 0 1 3 5 7	fruit	0.08 0.08 0.13 0.18 0.13 0.13 0.12 0.12 0.09 0.12 0.10 0.09 m 0.10	DuPont-2581
Greece, 2000 (Granny Smith)	WG 3S+1R	0.104	0.005	2040	3 4	9 0 1 3 5 7	fruit	0.06 0.06 0.14 0.13 0.11 0.11 0.09 0.08 0.08 0.09 0.06 0.06 m 0.06	DuPont-4355
Hungary, 1996 (Jonathan)	SC 3S+1R	0.051	0.0051	1000	6	0 14	fruit	0.34 0.35 0.13 0.19	H-96-003-MOR
Hungary, 1996 (Starking)	SC 3S+1R	0.051	0.0051	890	6	0 14	fruit	0.13 0.16 0.02 0.03	H-96-003-MOR
Italy, 1999 (Golden Delicious)	WG 3S+1R	0.097	0.010	1000	3 4	8 0 1 3 5 7	fruit	0.17 0.18 0.35 0.31 0.30 0.29 0.29 0.24 0.25 0.27 0.22 0.19 m 0.21	DuPont-2581
Italy, 1999 (Stark Delicious)	WG 3S+1R	0.080	0.005	1600	4	7	fruit	0.07 0.06 m 0.07	DuPont-2581
Italy, 2000 (Stayman)	WG 3S+1R	0.074	0.005	1540	4	7	fruit	0.07 0.06 m 0.07	DuPont-4355
South Africa, 1999 (Golden Delicious) 1/	WG 3S+1R	0.038		1110	5 6	13 0 1 3 7 14 21 28	fruit	0.72 0.79 1.3 1.3 1.1 1.1 1.1 1.1 1.0 1.0 1.1 1.2 0.46 0.59 0.58 0.62	5437/145544 5/T257
South Africa, 1999 (Golden Delicious) 1/	WG 3S+1R	0.076	0.0068	1110	5 6	13 0 1 3 7 14 21 28	fruit	0.67 0.68 1.5 1.2 1.6 1.7 1.3 1.5 1.1 1.2 0.62 1.1 0.58 0.65 1.1 1.1 m 1.1	5437/145544 5/T257

APPLES country, year (variety)	Application 1/ Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
South Africa, 1999 (Granny Smith) 1/ 2/	WG 3S+1R		0.012	4500	5 6	14 0 1 3 7 14 28	fruit	0.88 0.83 0.68 0.73 1.2 1.1 0.98 1.1 1.3 1.2 0.90 0.95 0.84 0.77	5437/153747 5/T656
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.075		1870	4	0 7 14 21 28	fruit	0.19 0.20 0.083 0.12 0.023 0.024 0.15 0.19 0.20 0.19	AMR 3950-96
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.15		1870	4	0 7 14 21 28	fruit	0.39 0.31 0.41 0.34 0.097 0.32 m 0.21 0.24 0.26 0.24 0.43	AMR 3950-96
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.075		1870	4	7	fruit	0.17 0.14	AMR 3952-96
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.15		1870	4	7	fruit	0.33 0.21	AMR 3952-96
USA (CA), 1996 (Red Delicious)	WG racemic	0.075		1870	4	0 7 14 21 28	fruit	0.048 0.049 0.30 0.28 0.30 0.32 0.23 0.16 0.28 0.22	AMR 3950-96
USA (CA), 1996 (Red Delicious)	WG racemic	0.15		1870	4	0 7 14 21 28	fruit	0.25 0.27 0.33 0.32 0.39 0.39 0.41 1.0 0.45 0.38	AMR 3950-96
USA (MI), 1996 (Red Delicious)	WG 3S+1R	0.075		940	4	7 14 28	fruit	0.29 0.30 0.088 0.23 0.066 0.16	AMR 3950-96
USA (MI), 1996 (Red Delicious)	WG 3S+1R	0.15		940	4	7 14 28	fruit	0.62 0.59 0.25 0.27 m 0.26 0.44 0.23	AMR 3950-96
USA (MI), 1996 (Red Delicious)	WG racemic	0.075		940	4	7 14 28	fruit	0.50 0.54 0.37 0.36 0.45 0.60	AMR 3950-96
USA (MI), 1996 (Red Delicious)	WG racemic	0.15		940	4	7 14 28	fruit	0.75 1.4 0.70 0.77 0.65 0.95	AMR 3950-96

APPLES country, year (variety)	Application 1/ Form	 kg ai/ha	 kg ai/hL	 water (L/ha)	 no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
USA (NY), 1996 (Cortland)	WG 3S+1R	0.075		940	4	0 7 14 21 28	fruit	0.29 0.20 0.15 0.15 0.11 0.087 0.061 0.082 0.079 0.11	AMR 3950-96
USA (NY), 1996 (Cortland)	WG 3S+1R	0.15		940	4	0 7 14 21 28	fruit	0.60 0.41 0.31 0.30 0.26 0.20 m 0.23 0.19 0.22 0.19 0.24	AMR 3950-96
USA (NY), 1996 (Cortland)	WG racemic	0.075		940	4	0 7 14 21 28	fruit	0.43 0.45 0.25 0.41 0.29 0.32 0.24 0.30 0.23 0.23	AMR 3950-96
USA (NY), 1996 (Cortland)	WG racemic	0.15		940	4	0 7 14 21 28	fruit	0.54 0.77 0.48 0.72 0.60 0.53 0.57 0.85 0.89 0.68	AMR 3950-96
USA (WA), 1996 (Red Delicious)	WG 3S+1R	0.075		1170	4	7 14 28	fruit	0.13 0.15 0.16 0.091 0.078 0.025	AMR 3950-96
USA (WA), 1996 (Red Delicious)	WG 3S+1R	0.15		1170	4	7 14 28	fruit	0.32 0.18 0.18 0.28 m 0.23 0.099 0.084	AMR 3950-96
USA (WA), 1996 (Rome)	WG 3S+1R	0.075		940	4	7 14 28	fruit	0.24 0.24 0.037 0.033 0.060 0.055	AMR 3950-96
USA (WA), 1996 (Rome)	WG 3S+1R	0.15		940	4	7 14 28	fruit	0.54 0.56 0.12 0.31 m 0.22 0.14 0.12	AMR 3950-96
USA (WA), 1996 (Rome)	WG racemic	0.075		940	4	7 14 28	fruit	0.32 0.26 0.32 0.31 0.18 0.19	AMR 3950-96
USA (WA), 1996 (Rome)	WG racemic	0.15		940	4	7 14 28	fruit	0.15 0.19 0.37 0.34 0.79 0.79	AMR 3950-96
USA (CA), 1999 (Rome)	WG 3S+1R	0.12		970	4	14	fruit	0.11 0.13 m 0.12	DuPont-2496
USA (CO), 1999 (Golden Delicious)	WG 3S+1R	0.12		700	4	14	fruit	0.073 0.10 m 0.087	DuPont-2496
USA (ID), 1999 (Rome)	WG 3S+1R	0.12		940	4	14	fruit	0.24 0.18 m 0.21	DuPont-2496

APPLES country, year (variety)	Application 1/					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (MD), 1999 (Golden Delicious)	WG 3S+1R	0.12		690	4	14	fruit	0.15 0.14 m 0.15	DuPont-2496
USA (MI), 1999 (Macintosh)	WG 3S+1R	0.12		700	4	14	fruit	0.22 0.19 m 0.21	DuPont-2496
USA (NY), 1999 (Macoun)	WG 3S+1R	0.12		930	4	14	fruit	0.24 0.15 m 0.20	DuPont-2496
USA (OR), 1999 (Jonagold)	WG 3S+1R	0.12		690	4	14	fruit	0.13 0.13 m 0.13	DuPont-2496
USA (PA), 1999 (Red Delicious)	WG 3S+1R	0.12		890	4	14	fruit	0.12 0.10 m 0.11	DuPont-2496
USA (WA), 1999 (Red Delicious)	WG 3S+1R	0.12		940	4	14	fruit	0.27 0.33 m 0.30	DuPont-2496

1/ Analytical results from the South African trials had been adjusted for procedural analytical recovery values.
2/ Minimal field report.
3/ m: mean.

Table 22. Indoxacarb residues in pears resulting from supervised trials in Australia, South Africa and USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

PEARS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Vic), 1998 (Packham's Triumph)	WG 3S+1R		0.0075	2400	11 12	14 0 3 7 14 21 28	fruit	0.05 0.45 0.32 0.24 0.30 0.27 0.21	99/2557 8399
Australia (Vic), 1998 (Packham's Triumph)	WG 3S+1R		0.015	2400	11 12	14 0 3 7 14 21 28	fruit	0.04 1.2 0.68 0.49 0.64 0.56 0.43	99/2557 8399
South Africa, 1999 (Packham Triumph) 1/ 2/	WG 3S+1R		0.012		4 5	14 0 1 3 7 14 21	fruit	0.72 0.63 1.0 0.91 0.74 1.0 0.63 0.83 0.87 0.91 0.80 0.60 0.90 0.90	5437/153746 7/T655

PEARS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
South Africa, 1999 (Packham Triumph) 1/ 2/	WG 3S+1R		0.012	1480	6 7	14 0 1 4 7 14 22 28	fruit	0.94 0.63 0.65 0.52 0.93 1.3 0.80 1.1 0.71 0.74 0.49 0.68 0.50 0.43 0.39 0.43	5437/1510264/T512
South Africa, 1999 (Packham Triumph) 2/	WG 3S+1R		0.024		7	0 1 4 7 14 22 28	fruit	2.3 2.1 1.6 2.0 1.2 2.0 1.7 1.7 1.6 1.5 1.3 1.1 1.1 1.1	5437/1510264/T512
USA (NY), 1996 (Clapp's Favorite)	WG 3S+1R	0.075		940	4	7 14 28	fruit	0.052 0.10 0.063 0.052 0.039 0.11	AMR 3951-96
USA (NY), 1996 (Clapp's Favourite)	WG 3S+1R	0.15		940	4	7 14 28	fruit	0.20 0.13 0.079 0.13 0.081 0.049 m 0.065	AMR 3951-96
USA (CA), 1996 (Bose)	WG 3S+1R	0.075		560	4	0 7 14 21 28	fruit	0.098 0.11 0.092 0.047 0.042 0.033 0.028 < 0.02 0.020 0.023	AMR 3951-96
USA (CA), 1996 (Bose)	WG 3S+1R	0.15		560	4	0 7 14 21 28	fruit	0.24 0.27 0.023 0.050 0.078 0.12 0.095 0.067 0.056 0.045 m 0.051	AMR 3951-96
USA (CA), 1996 (Bartlett)	WG 3S+1R	0.075		1280	4	7 14 24	fruit	0.026 0.020 < 0.02 (2) < 0.02 0.037	AMR 3951-96
USA (CA), 1996 (Bartlett)	WG 3S+1R	0.15		1280	4	7 14 24	fruit	0.057 0.086 0.030 0.028 0.035 0.049 m 0.42	AMR 3951-96
USA (WA), 1996 (Bartlett)	WG 3S+1R	0.075		940	4	7 14 28	fruit	0.090 0.074 0.037 0.037 0.035 0.036	AMR 3951-96
USA (WA), 1996 (Bartlett)	WG 3S+1R	0.15		940	4	7 14 28	fruit	0.15 0.18 0.059 0.070 0.060 0.074 m 0.067	AMR 3951-96
USA (WA), 1996 (Bartlett)	WG 3S+1R	0.075		1400	4	7 14 28	fruit	0.054 0.067 0.059 0.031 0.048 0.039	AMR 3951-96

PEARS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (WA), 1996 (Bartlett)	WG 3S+1R	0.15		1400	4	7 14 28	fruit	0.14 0.15 0.032 0.22 0.10 0.12 m 0.11	AMR 3951-96
USA (WA), 1996 (Red Bartlett)	WG 3S+1R	0.075		1100	4	7 14 28	fruit	0.033 0.034 0.035 0.034 0.039 0.046	AMR 3951-96
USA (WA), 1996 (Red Bartlett)	WG 3S+1R	0.15		1100	4	7 14 28	fruit	0.094 0.087 0.082 0.084 0.051 0.051 m 0.051	AMR 3951-96

1/ Analytical results from the South African trials had been adjusted for procedural analytical recovery values.
2/ Minimal field report.
3/ m: mean

Table 23. Indoxacarb residues in stone fruits resulting from supervised trials in Australia, France, Greece, Italy and Spain with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

STONE FRUITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
APRICOT									
Australia (Vic), 2000 (Trevat)	WG 3S+1R		0.0075	1000	3	0 3 7 14 21	fruit	1.3 1.2 1.5 1.2 1.3 c 0.03	1P00764 0740
Australia (Vic), 2000 (Trevat)	WG 3S+1R		0.015	1000	3	0 3 7 14 21	fruit	1.8 2.1 2.1 2.2 2.1 c 0.03	1P00764 0740
NECTARINE									
Australia (Vic), 1999 (August Red)	WG 3S+1R		0.0052	2000	10	0 3 7 14 21 28	fruit	0.37 0.21 0.13 0.10 0.16 0.11	99/2578
Australia (Vic), 1999 (August Red)	WG 3S+1R		0.0105	2000	10	0 3 7 14 21 28	fruit	0.47 0.34 0.40 0.27 0.16 0.16	99/2578

STONE FRUITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Vic), 2000 (August Red)	WG 3S+1R		0.0075		3	0 7 14 21 28	fruit	0.23 0.20 0.17 0.13 0.15	0P03006 9609
Australia (Vic), 2000 (August Red)	WG 3S+1R		0.015		3	0 7 14 21 28	fruit	0.52 0.35 0.17 0.26 0.24	0P03006 9609
Australia (Vic), 2000 (Harmony)	WG 3S+1R		0.0075		3	0 7 14 21 28	fruit	0.58 0.29 0.21 0.14 0.10	0P03007 9610
Australia (Vic), 2000 (Harmony)	WG 3S+1R		0.015		3	0 7 14 21 28	fruit	1.3 0.72 0.24 0.21 0.23	0P03007 9610
PEACH									
Australia (Vic), 1998 (Tatura Noon)	WG 3S+1R		0.015	2000	6	0 7 14 21 28	fruit	0.29 1.2 0.63 0.57 0.69	98/2777 7530
Australia (Vic), 1998 (Tatura Noon)	WG 3S+1R		0.005	2000	6	0 3 7 14 21 28	fruit	0.80 0.33 0.31 0.36 0.16 0.30	98/2777 7530
Australia (Vic), 1998 (Tatura Noon)	WG 3S+1R		0.0075	2000	6	0 3 7 14 21 28	fruit	0.71 0.64 0.86 0.46 0.43 0.19	98/2777 7530
Australia (Vic), 1999 (Taylor Queens) 3/	WG 3S+1R		0.0052	2000	10	0 3 7 14 21 28	fruit	0.82 0.61 0.59 0.71 0.46 0.41	99/2579

STONE FRUITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Vic), 1999 (Taylor Queens) 3/	WG 3S+1R		0.0105	2000	10	0 3 7 14 21 28	fruit	1.3 1.1 1.1 1.1 0.87 0.77	99/2579
France, 1999 (Fidelia) 2/	WG 3S+1R	0.049	0.005	1000	3 4	10 0 1 3 5 7	fruit	0.06 0.05 0.11 0.11 0.11 0.10 0.10 0.09 0.06 0.07 0.04 0.05	DuPont-2579
France, 2000 (Promesse)	WG 3S+1R	0.093	0.005	1860	3 4	9 0 1 3 5 7	fruit	0.05 0.09 0.33 0.31 0.30 0.29 0.16 0.15 0.11 0.11 0.09 0.11 m 0.10	DuPont-4308
Greece, 1999 (Andros) 2/	WG 3S+1R	0.092	0.005	1920	3 4	10 0 1 3 5 7	fruit	0.10 0.07 0.17 0.55 0.55 0.46 0.50 0.44 0.38 0.28 0.28 0.27 0.13 0.18 0.17 0.08 0.15 0.14 m 0.12	DuPont-2579
Greece, 2000 (Sun Claus)	WG 3S+1R	0.098	0.005	1950	4	7	fruit	0.18 0.18 m 0.18	DuPont-4308
Greece, 2000 (Sun Crest)	WG 3S+1R	0.099	0.005	1970	3 4	11 0 1 3 5 7	fruit	0.16 0.16 0.28 0.27 0.40 0.40 0.25 0.27 0.22 0.15 0.13 0.13 m 0.13	DuPont-4308
Italy, 1999 (Ohnri) 2/	WG 3S+1R	0.049	0.003	1510	4	7	fruit	0.10 0.10	DuPont-2579
Italy, 1999 (Rosa del West) 2/	WG 3S+1R	0.075	0.005	1570	3 4	10 0 1 3 5 7	fruit	0.10 0.02 0.18 0.23 0.13 0.09 0.13 0.10 0.12 0.10 0.06 0.08 m 0.07	DuPont-2579
Italy, 2000 (Cresthaven)	WG 3S+1R	0.089	0.005	1870	4	7	fruit	0.16 0.15 m 0.16	DuPont-4308
Italy, 2000 (Franca)	WG 3S+1R	0.094	0.005	1980	4	7	fruit	0.09 0.13 m 0.11	DuPont-4308

STONE FRUITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Italy, 2000 (Michelin)	WG 3S+1R	0.095	0.005	2000	3 4	10 0 1 3 5 7	fruit	0.08 0.07 0.16 0.16 0.12 0.14 0.10 0.12 0.10 0.09 0.07 0.05 m 0.06	DuPont-4308
Spain, 1999 (Baby Gold 6) 2/	WG 3S+1R	0.080	0.005	1610	4	7	fruit	0.04 0.05 m 0.05	DuPont-2579

1/ c: sample from control plot. m: mean.
2/ In European trials of 1999 (DuPont-2579), the peach stone:flesh weight ratio ranged from 0.035 to 0.10 at peach maturity and 0.035 to 0.19 for immature fruit, with variations depending on variety. In European trials of 2000 (DuPont-4308), the peach stone:flesh weight ratio ranged from 0.038 to 0.054 at peach maturity and 0.040 to 0.072 for immature fruit. Analytical results are apparently expressed on flesh.
3/ Minimal field report.

Table 24. Indoxacarb residues in grapes resulting from supervised trials in Australia, France, Germany, Greece, Hungary, Italy, Spain and USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

GRAPES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (SA), 1999 (Chardonnay)	WG 3S+1R	0.037	0.0059	625	2 3	21 0 7 14 28 61	grapes	0.18 0.54 0.13 0.28 0.14 0.18	99/3980
Australia (SA), 1999 (Chardonnay)	WG 3S+1R	0.051	0.0082	625	2 3	21 0 7 14 28 61	grapes	0.35 0.39 0.39 0.30 0.20 0.23	99/3980
Australia (SA), 1999 (Chardonnay)	WG 3S+1R	0.075	0.012	625	2 3	21 0 7 14 28 61	grapes	0.42 1.3 0.69 0.56 0.61 0.60	99/3980
Australia (SA), 1999 (Chardonnay)	WG 3S+1R	0.15	0.024	625	2 3	21 0 7 14 28 61	grapes	0.82 2.1 1.1 0.95 0.82 0.76	99/3980

GRAPES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (SA), 1999 (Chardonnay) 1/	WG 3S+1R	0.051		1000	3 4	32 0 6 14 28 60	grapes	0.03 0.08 0.08 < 0.02 0.02 0.04	0P02950 9531 Mt Pleasant SA
Australia (SA), 1999 (Chardonnay) 1/	WG 3S+1R	0.10		1000	3 4	32 0 6 14 28 60	grapes	< 0.02 0.33 0.16 0.14 0.09 0.09	0P02950 9531 Mt Pleasant SA
Australia (SA), 1999 (Riesling)	WG 3S+1R	0.037	0.0062	600	2 3	21 0 7 14 28 61	grapes	0.35 1.2 0.61 0.61 0.36 0.33	99/3979
Australia (SA), 1999 (Riesling)	WG 3S+1R	0.051	0.0085	600	2 3	21 0 7 14 28 61	grapes	0.52 1.1 0.57 0.61 0.26 0.37	99/3979
Australia (SA), 1999 (Riesling)	WG 3S+1R	0.075	0.012	600	2 3	21 0 7 14 28 61	grapes	0.62 1.9 1.3 1.0 0.64 0.52	99/3979
Australia (SA), 1999 (Riesling)	WG 3S+1R	0.15	0.025	600	2 3	21 0 7 14 28 61	grapes	1.1 2.5 2.5 2.3 1.4 1.2	99/3979
Australia (Vic), 1998 (Cabernet Sauvignon)	WG 3S+1R		0.003	500	5 6	21 0 3 7 14 21 28	grapes	0.07 0.10 0.07 0.16 0.11 0.12 0.22	98/5075
Australia (Vic), 1998 (Cabernet Sauvignon)	WG 3S+1R		0.006	500	5 6	21 0 3 7 14 21 28	grapes	0.07 0.21 0.25 0.24 0.24 0.15 0.24	98/5075

GRAPES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Vic), 1999 (Chardonnay)	WG 3S+1R	0.051		1000	3	0 28 42 77	grapes	0.14 < 0.02 0.09 0.04	0P03017
Australia (Vic), 1999 (Chardonnay)	WG 3S+1R	0.10		1000	3	0 28 42 77	grapes	0.28 0.03 0.05 0.13	0P03017
Australia (Vic), 1999 Cabernet	WG 3S+1R	0.051			4	0 7 14 28 62	grapes	0.44 0.16 0.22 0.18 0.10	99/2576
Australia (Vic), 1999 Cabernet	WG 3S+1R	0.075			4	0 7 14 28 62	grapes	0.28 0.74 0.51 0.34 0.25	99/2576
France, 1998 (Wine grapes, Chardonnay)	WG 3S+1R	0.036	0.009	410	3	10	grapes	0.02 < 0.02 m 0.02	AMR 5009-98
France, 1998 (Wine grapes, Chardonnay)	SC 3S+1R	0.037	0.009	420	3	10	grapes	0.04 0.03 m 0.04	AMR 5009-98
France, 1998 (Wine grapes, Grenache)	WG 3S+1R	0.039	0.007	540	3	10	grapes	0.04 0.05 m 0.05	AMR 5009-98
France, 1998 (Wine grapes, Grenache)	SC 3S+1R	0.037	0.007	520	3	10	grapes	0.05 0.04 m 0.05	AMR 5009-98
France, 1998 (Wine grapes, Pinot Noir)	WG 3S+1R	0.042	0.007	600	2 3	10 0 1 3 5 10	grapes	< 0.02 (2) 0.07 0.07 0.06 0.06 0.03 0.04 0.03 0.03 0.02 0.02 m 0.02	AMR 5009-98
France, 1998 (Wine grapes, Pinot Noir)	SC 3S+1R	0.038	0.007	560	2 3	10 0 1 3 5 10	grapes	< 0.02 (2) 0.11 0.11 0.04 0.08 0.04 0.07 0.04 0.04 0.03 0.02 m 0.03	AMR 5009-98
France, 1998 (Wine grapes, Sauvignon)	WG 3S+1R	0.039	0.007	550	2 3	11 0 1 3 5 10	grapes	< 0.02 (2) 0.08 0.08 0.05 0.05 0.04 0.05 0.04 0.04 < 0.02 0.02 m 0.02	AMR 5009-98

GRAPES	Application					PHI	Commodity	Residues, mg/kg	Ref
country, year (variety)	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		indoxacarb + R enantiomer 2/	
France, 1998 (Wine grapes, Sauvignon)	SC 3S+1R	0.038	0.007	530	2 3	11 0 1 3 5 10	grapes	< 0.02 (2) 0.11 0.10 0.06 0.06 0.05 0.05 0.05 0.04 < 0.02 0.03 m 0.02	AMR 5009-98
France, 1999 (Cabernet Franc)	WG 3S+1R	0.038	0.004	920	3	10	grapes	0.04 0.04 m 0.04	DuPont-2582
France, 1999 (Cabernet Sauvignon)	WG 3S+1R	0.035	0.005	780	2 3	10 0 1 3 5 10	grapes	0.06 0.06 0.10 0.11 0.09 0.10 0.08 0.07 0.08 0.09 0.07 0.07 m 0.07	DuPont-2582
France, 1999 (Chenin Blanc)	WG 3S+1R	0.037	0.006	620	3	10	grapes	0.03 0.04 m 0.04	DuPont-2582
France, 1999 (Pinot Meunier)	WG 3S+1R	0.034	0.006	570	2 3	10 0 1 3 5 10	grapes	0.04 0.04 0.14 0.17 0.08 0.11 0.07 0.10 0.04 0.08 0.04 0.04 m 0.04	DuPont-2582
France, 1999 (Sauvignon)	WG 3S+1R	0.036	0.005	710	3	10	grapes	0.03 < 0.02 m 0.02	DuPont-2582
France, 1999 (Table grapes, Muscat)	WG 3S+1R	0.038	0.005	780	5 6	10 0 1 3 5 7	grapes	0.04 0.03 m 0.04 0.05 0.06 0.05 0.05 0.04 0.04 0.03 0.04 0.03 0.03	DuPont-2580
France, 2000 (Chenin)	WG 3S+1R	0.038	0.006	644	3	10	grapes	0.04 0.03 m 0.04	DuPont-4451
France, 2000 (Merlot)	WG 3S+1R	0.055	0.004	1290	2 3	11 0 1 3 5 10	grapes	0.07 0.06 0.21 0.18 0.19 0.19 0.16 0.17 0.15 0.14 0.12 0.13	DuPont-4451
Germany, 1998 (Wine grapes, Kerner)	WG 3S+1R	0.038	0.005	800	2 3	10 0 1 3 5 10	grapes	0.03 0.02 m 0.03 0.05 0.05 0.05 0.04 0.04 0.03 0.03 0.03 < 0.02 (2)	AMR 5009-98
Germany, 1998 (Wine grapes, Riesling)	WG 3S+1R	0.040	0.005	880	3	10	grapes	0.07 0.09	AMR 5009-98

GRAPES country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
Germany, 1999 (Riesling)	WG 3S+1R	0.063	0.007	870	3	10 14	grapes	0.13 0.06 0.06 0.06 m 0.06	DuPont-2582
Germany, 1999 (Riesling)	WG 3S+1R	0.057	0.007	790	2 3	10 0 1 3 5 10 14	grapes	0.11 0.11 0.19 0.18 0.16 0.15 0.15 0.13 0.12 0.11 0.13 0.12 0.10 0.11 m 0.11	DuPont-2582
Germany, 1999 (Scheurebe)	WG 3S+1R	0.063	0.007	870	3	10 14	grapes	0.04 0.05 0.04 0.03 m 0.04	DuPont-2582
Greece, 1998 (Table grapes, Moshato)	WG 3S+1R	0.036	0.007	480	5 6	9 0 1 3 5 7	grapes	0.07 0.06 0.13 0.11 0.11 0.09 0.09 0.09 0.08 0.08 0.07 0.06	AMR 5007-98
Greece, 1998 (Table grapes, Soultanina)	WG 3S+1R	0.039	0.007	515	6	3	grapes	0.14 0.14	AMR 5007-98
Greece, 1999 (Roditis)	WG 3S+1R	0.044	0.004	1200	2 3	10 0 1 3 5 10	grapes	0.03 0.03 0.10 0.11 0.08 0.09 0.06 0.08 0.05 0.05 0.10 0.085	DuPont-2582
Greece, 1999 (Table grapes, Moshato)	WG 3S+1R	0.052	0.004	1430	5 6	9 0 1 3 5 7	grapes	0.13 0.10 m 0.12 0.24 0.23 0.19 0.16 0.15 0.15 0.16 0.15 0.14 0.14	DuPont-2580
Hungary, 1996 (Furmint)	SC 3S+1R	0.045	0.0045	1000	2 3	16 0 3 7 14 28	grapes	0.70 0.48 0.78 1.0 0.51 0.41 m 0.46 0.50 0.58 0.64 0.44 0.45 0.16	H-96-002-COM
Hungary, 1996 (Green Veltelin)	SC 3S+1R	0.045	0.0042	1080	2 3	16 0 3 7 14 28	grapes	0.09 0.06 0.14 0.16 0.13 0.10 m 0.12 0.07 0.06 0.11 0.08 0.07 0.07 0.05 0.05	H-96-002-COM
Italy, 1998 (Table grapes, Italia)	WG 3S+1R	0.036	0.006	600	5 6	10 0 1 3 5 7	grapes	0.14 0.08 m 0.11 0.31 0.33 0.23 0.27 0.19 0.20 0.14 0.16 0.09 0.11	AMR 5007-98

GRAPES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Italy, 1998 (Table grapes, Italia)	WG 3S+1R	0.035	0.003	1160	6	3	grapes	0.22 0.21	AMR 5007-98
Italy, 1999 (Cabernet Sauvignon)	WG 3S+1R	0.036	0.004	1000	2 3	10 0 1 3 5 10	grapes	0.06 0.06 0.28 0.27 0.26 0.22 0.18 0.13 0.14 0.14 0.14 0.12 m 0.13	DuPont-2582
Italy, 1999 (Chardonnay)	WG 3S+1R	0.037	0.004	1020	3	10	grapes	0.06 0.06 m 0.06	DuPont-2582
Italy, 1999 (Table grapes, Italia)	WG 3S+1R	0.046	0.004	1270	5 6	11 0 1 3 5 7	grapes	0.12 0.16 m 0.14 0.26 0.26 0.26 0.22 0.20 0.20 0.13 0.13 0.09 0.11	DuPont-2580
Italy, 1999 (Table grapes, Italia)	WG 3S+1R	0.036	0.005	800	6	3	grapes	0.28 0.26	DuPont-2580
Italy, 2000 (Cabernet-Sauvignon)	WG 3S+1R	0.056	0.004	1300	2 3	10 0 1 3 5 10	grapes	0.12 0.21 m 0.17 0.21 0.26 0.22 0.18 0.17 0.17 0.10 0.16 0.06 0.10	DuPont-4451
Italy, 2000 (Chardonnay)	WG 3S+1R	0.058	0.004	1350	3	10	grapes	0.10 0.16 m 0.13	DuPont-4451
Italy, 2000 (Pignoletto)	WG 3S+1R	0.058	0.004	1370	2 3	11 0 1 3 5 10	grapes	0.25 0.18 m 0.22 0.37 0.32 0.33 0.30 0.30 0.26 0.23 0.26 0.16 0.17	DuPont-4451
Spain, 1998 (Wine grapes, Parellada)	WG 3S+1R	0.036	0.006	570	3	10	grapes	0.19 0.18 m 0.19	AMR 5009-98
Spain, 1999 (Parellada)	WG 3S+1R	0.038	0.006	590	6	10	grapes	0.13 0.15 m 0.14	DuPont-2582
Spain, 1999 (Table grapes, Napoleon)	WG 3S+1R	0.036	0.004	970	6	3	grapes	0.19 0.16	DuPont-2580
Spain, 2000 (Bobal)	WG 3S+1R	0.060	0.005	1320	3	10	grapes	0.11 0.15 m 0.13	DuPont-4451
USA (CA), 2002 (Cabernet Sauvignon)	WG 3S+1R	0.12		560	4	7	grapes	0.23 0.087 m 0.16	DuPont-9878
USA (CA), 2002 (Chardonnay)	WG 3S+1R	0.12		940	4	7	grapes	1.7 1.3 m 1.5	DuPont-9878

GRAPES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (CA), 2002 (Merlot)	WG 3S+1R	0.12		940	4	7	grapes	0.45 0.42 m 0.44	DuPont-9878
USA (CA), 2002 (Syrah)	WG 3S+1R	0.12		840	4	7	grapes	1.4 1.3 m 1.4	DuPont-9878
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.12		580	4	7	grapes	0.13 0.20 m 0.17	DuPont-9878
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.12		890	4	7	grapes	0.11 0.066 m 0.088	DuPont-9878
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.12		670	4	0 1 3 7 10	grapes	0.78 0.73 0.54 0.69 0.45 0.51 0.73 0.77 m 0.75 0.66 0.53	DuPont-9878
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.12		840	4	7	grapes	0.31 0.33 m 0.32	DuPont-9878
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.12		700	4	7	grapes	0.48 0.35 m 0.42	DuPont-9878
USA (NY), 2002 (Concord)	WG 3S+1R	0.12		470	4	0 1 3 7 10	grapes	0.35 0.28 0.30 0.39 0.44 0.18 0.27 0.22 0.31 0.20 m 0.26	DuPont-9878
USA (PA), 2002 (Niagara)	WG 3S+1R	0.12		890	4	7	grapes	0.20 0.16 m 0.18	DuPont-9878
USA (WA), 2002 (Merlot)	WG 3S+1R	0.12		470	4	7	grapes	0.45 0.33 m 0.39	DuPont-9878
USA (WA), 2002 (White Reisling)	WG 3S+1R	0.12		690	4	0 1 3 7 10	grapes	0.46 0.29 0.45 0.33 0.30 0.30 0.25 0.29 0.27 0.29 m 0.28	DuPont-9878

1/ Minimal field report.
2/ m: mean.

Table 25. Indoxacarb residues in cabbage resulting from supervised trials in Australia, Belgium, Denmark, France, Germany, Greece, India, Netherlands, Portugal, Italy, South Africa, Spain, UK and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

CABBAGES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 1998 (Cameron)	WG 3S+1R	0.075		100 -530	5	0 3 7 14 21 28	head with wrapper leaves	0.38 c 0.02 0.43 0.21 0.11 0.16 0.10	98/2376
Australia (NSW), 1998 (Cameron)	WG 3S+1R	0.15		100 -530	5	0 3 7 14 21 28	head with wrapper leaves	0.94 1.3 0.58 0.58 0.42 0.47	98/2376
Australia (NSW), 1999 (Green Coronet)	WG 3S+1R	0.075		240	4	0 7 14 21 28	head with wrapper leaves	0.46 < 0.02 < 0.01 < 0.02 < 0.01	99/4790 9339
Australia (NSW), 1999 (Green Coronet)	WG 3S+1R	0.15		240	4	0 7 14 21 28	head with wrapper leaves	0.67 < 0.02 < 0.02 < 0.01 < 0.01	99/4790 9339
Australia (Qld), 1999 (Warrior)	WG 3S+1R	0.15		400	4	1 14 21 28	cabbage heart	0.72 0.09 0.09 0.03	99/2214 99/2857 AUJ99-07
Australia (Qld), 1999 (Warrior) 5/	WG 3S+1R	0.075		400	4	1 14 21 28	cabbage heart	0.64 0.26 0.02 0.02	99/2214 99/2857 AUJ99-07
Australia (Qld), 1999 (Warrior) 5/	WG 3S+1R	0.075		400	4	1 14 21 28	cabbage heart	0.69 0.25 0.03 0.02	99/2214 99/2857 AUJ99-07
Australia, 1997 3/	WG 3S+1R	0.075				0 2 6 13 28	cabbage	1.5 1.9 0.79 0.51 0.07	97/5539
Australia, 1997 3/	WG 3S+1R	0.10				0 2 6 13 28	cabbage	1.6 1.05 0.82 0.49 0.25	97/5539

CABBAGES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Qld), 2002 Won Bok, Chinese cabbage	WG 3S+1R	0.051		510	3	0 3 7 14	heads	1.1 0.03 0.03 < 0.01	2E4303 COM736-1
Australia (Qld), 2002 Won Bok, Chinese cabbage	WG 3S+1R	0.10		510	3	0 3 7 14	heads	1.1 0.05 0.04 < 0.02	2E4303 COM736-1
Australia (WA), 2002 (Ming Emperor) Won Bok, Chinese cabbage	WG 3S+1R	0.051		700	3	0 3 7 14	heads	0.04 < 0.02 0.02 < 0.01	2R00281 COM736-5
Australia (WA), 2002 (Ming Emperor) Won Bok, Chinese cabbage	WG 3S+1R	0.10		700	3	0 3 7 14	heads	0.13 0.03 0.03 < 0.02	2R00281 COM736-5
Belgium, 1996 (Savoy cabbage, Milan)	WG 3S+1R	0.026	0.003	820	3	3	head	≤ 0.02	AMR 4011-96
Denmark, 1998 (Parel) White cabbage	WG 3S+1R	0.023	0.012	180	3	1	heads	< 0.02 (2) m < 0.02	AMR 5011-98
France, 1996 (Deluce)	WG 3S+1R	0.026	0.003	810	3	3	head	< 0.02 (2) m< 0.02	AMR 4011-96
France, 1996 (Cantasa) 4/	WG 3S+1R	0.026	0.003	820	2 3	15 0 1 3 7 14	head	0.02 0.03 0.05 0.07 0.08 0.07 0.06 0.08 0.08 0.10 m 0.08 0.04 0.07 0.02 0.04	AMR 4011-96
France, 1996 (Cantasa) 4/	WG racemic	0.026	0.003	780	2 3	15 0 1 3 7 14	head	0.13 0.21 0.20 0.18 0.075 0.26 0.025 0.07 0.16 0.22 0.035 0.14 0.11 0.03	AMR 4011-96
France, 1998 (Famosa) Savoy cabbage	WG 3S+1R	0.027	0.003	920	3	1	heads	0.02 < 0.02 m 0.02	AMR 5011-98
France, 2001 (Savoy cabbage, Wirosa)	WG 3S+1R	0.027	0.005	510	2 3	10 0 1 3	heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	Du-Pont-6062

CABBAGES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 2000 (Hidena)	WG 3S+1R	0.025	0.007	360	2 3	10 0 1 3	heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-4575
France, 2000 (Famosa)	WG 3S+1R	0.026	0.005	530	2 3	10 0 1 3	heads	0.06 0.04 0.05 0.10 0.03 0.09 0.04 0.06 m 0.05	DuPont-4575
France, 2000 (Lennox)	WG 3S+1R	0.025	0.005	530	2 3	10 0 1 3	heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-4575
Germany, 2000 (Lion)	WG 3S+1R	0.023	0.004	570	2 3	10 0 1 3	heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-4575
Germany, 2001 (Castello)	WG 3S+1R	0.027	0.004	610	2 3	11 0 1 3	heads	< 0.02 (2) < 0.02 0.02 < 0.02 (2) < 0.02 (2) m < 0.02	Du-Pont-6062
Germany, 1996 (Edison F1) 4/	WG 3S+1R	0.026	0.003	800	2 3	13 0 1 3 7 14	head	< 0.02 (2) 0.04 0.03 0.04 < 0.02 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2)	AMR 4011-96
Germany, 1996 (Edison F1) 4/	WG racemic	0.026	0.003	800	2 3	13 0 1 3 7 14	head	< 0.02 0.02 0.07 0.11 0.05 0.04 0.03 0.04 0.03 0.02 < 0.02 (2)	AMR 4011-96
Greece, 1996 (Granoslam)	WG 3S+1R	0.026	0.003	800	3	3	head	< 0.02 (2) m ≤ 0.02	AMR 4011-96
India, 1997 (Maharani)	SC 3S+1R	0.02		400 - 650	4	3 7 10	cabbage 3 replicate plots	< 0.01 (3) < 0.01 (3) < 0.01 (3)	R-001/1998
India, 1997 (Maharani)	SC 3S+1R	0.02		400 - 650	4	3 7 10	cabbage 3 replicate plots	< 0.01 (3) < 0.01 (3) < 0.01 (3)	R-002/1998
India, 1997 (Maharani)	SC 3S+1R	0.02		400 - 650	4	3 7 10	cabbage 3 replicate plots	< 0.01 (3) < 0.01 (3) < 0.01 (3)	R-003/1998
India, 1997 (Maharani)	SC 3S+1R	0.04		400 - 650	4	3 7 10	cabbage 3 replicate plots	0.01 0.02 0.01 0.01 0.02 m 0.02 < 0.01 (3)	R-001/1998

CABBAGES country, year (variety)	Application Form	 kg ai/ha	 kg ai/hL	 water (L/ha)	 no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
India, 1997 (Maharani)	SC 3S+1R	0.04		400 - 650	4	3 7 10	cabbage 3 replicate plots	< 0.01 (3) < 0.01 (3) < 0.01 (3)	R-002/1998
India, 1997 (Maharani)	SC 3S+1R	0.04		400 - 650	4	3 7 10	cabbage 3 replicate plots	0.03 0.02 0.03 < 0.01 (3) m < 0.01 < 0.01 (3)	R-003/1998
India, 1997 (Maharani)	SC 3S+1R	0.08		400 - 650	4	3 7 10	cabbage 3 replicate plots	0.16 0.18 0.19 0.04 0.04 0.04 < 0.01 (3)	R-001/1998
India, 1997 (Maharani)	SC 3S+1R	0.08		400 - 650	4	3 7 10	cabbage 3 replicate plots	0.18 0.15 0.16 0.07 < 0.01 (2) < 0.01 (3)	R-002/1998
India, 1997 (Maharani)	SC 3S+1R	0.08		400 - 650	4	3 7 10	cabbage 3 replicate plots	0.24 0.21 0.22 0.06 0.06 0.10 < 0.01 (3)	R-003/1998
Italy, 1996 (Tête de Pierre) 4/	WG 3S+1R	0.026	0.003	800	2 3	14 0 1 3 7 14	head	< 0.02 (2) 0.02 0.05 < 0.02 (2) < 0.02 (4) m < 0.02 < 0.02 (2) < 0.02 (2)	AMR 4011-96
Italy, 1996 (Tête de Pierre) 4/	WG racemic	0.026	0.003	800	2 3	14 0 1 3 7 14	head	< 0.02 (2) < 0.02 (2) 0.02 0.04 < 0.02 (3) 0.03 < 0.02 (2) < 0.02 (2)	AMR 4011-96
Italy, 1998 (Marcanta) Savoy cabbage	WG 3S+1R	0.024	0.003	780	3	1	heads	< 0.02 (2) m < 0.02	AMR 5011-98
Italy, 2000 (Marcanta)	WG 3S+1R	0.024	0.005	500	2 3	10 0 1 3	heads	< 0.02 (2) 0.02 < 0.02 < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-4575
Netherlands, 1996 (Savoy cabbage, Midvoy) 4/	WG 3S+1R	0.025	0.003	770	2 3	14 0 1 3 7 14	head	< 0.02 (2) 0.13 0.11 0.11 0.09 0.09 0.09 m 0.09 0.06 0.05 0.03 0.03	AMR 4011-96
Netherlands, 1996 (Savoy cabbage, Midvoy) 4/	WG racemic	0.026	0.003	780	2 3	14 0 1 3 7 14	head	0.09 0.09 0.29 0.23 0.39 0.39 0.32 0.28 0.21 0.15 0.10 0.12	AMR 4011-96
Netherlands, 1998 (Protovoy) Savoy cabbage	WG 3S+1R	0.025	0.003	810	3	1	heads	< 0.02 (2) m ≤ 0.02	AMR 5011-98

CABBAGES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Netherlands, 2000 (Saga)	WG 3S+1R	0.024	0.005	490	2 3	9 0 1 3	heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-4575
Portugal, 1996 (Portuguesa)	WG 3S+1R	0.026	0.003	900	3	3	head	< 0.02 (2) m < 0.02	AMR 4011-96
South Africa, 1999 (Conquestador) 2/ 6/	WG 3S+1R	0.053		300 -500	4 5	9 0 1 3 7 14 28	whole heads	0.11 0.10 0.66 0.64 0.93 0.98 0.81 0.85 m 0.83 0.19 0.19 < 0.01 (2) < 0.01 (2)	311/P218B Nelspruit
South Africa, 1999 (Conquestador) 2/ 6/	SC 3S+1R	0.053		300 -500	4 5	9 0 1 3 7 14 28	whole heads	0.99 1.0 3.4 3.2 2.3 2.4 0.47 0.46 m 0.47 0.55 0.59 < 0.01 (2) < 0.01 (2)	311/P218B Nelspruit
South Africa, 1999 (Conquestador) 2/ 6/	WG 3S+1R	0.053		300 -500	4 5	7 0 1 3 7 14 28	whole heads	0.24 0.23 1.1 1.1 1.2 1.2 0.39 0.41 m 0.40 0.43 0.44 0.04 0.04 < 0.01 (2)	311/P218B Groblersdal
South Africa, 1999 (Conquestador) 2/ 6/	SC 3S+1R	0.053		300 -500	4 5	7 0 1 3 7 14 28	whole heads	1.1 0.92 3.0 3.1 3.3 3.5 2.0 2.0 m 2.0 1.5 1.6 0.60 0.60 < 0.01 (2)	311/P218B Groblersdal
Spain, 1996 (Rio Grande)	WG 3S+1R	0.029	0.005	610	3	3	head	< 0.02 (2) m < 0.02	AMR 4011-96
UK, 1996 (Patron)	WG 3S+1R	0.026	0.003	810	3	3	head	< 0.02 (2) m < 0.02	AMR 4011-96
USA (CA), 1995 (Grenadier #5)	WG racemic	0.075		270	4	0 3 7 14 21 0 3 7 14 21	cabbage with wrapper leaves cabbage without wrapper leaves	1.1 0.50 3.8 0.71 1.1 1.7 0.19 0.64 0.82 0.67 0.030 0.12 0.15 0.089 0.056 0.086 < 0.02 (2) < 0.02 (2)	AMR 3287-95 AMR 3287-95

CABBAGES country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
USA (MD), 1995 (Market Prize)	WG racemic	0.075			4	4 6 13 4 6 13	cabbage with wrapper leaves cabbage without wrapper leaves	0.87 4.0 1.7 2.5 1.4 1.3 3.3 0.10 0.038 0.078 0.052 0.048 0.033	AMR 3287-95 AMR 3287-95
USA (FL), 1995 (Bravo)	WG racemic	0.075			4	3 7 21 3 3 7 21 3	cabbage with wrapper leaves cabbage without wrapper leaves	2.3 2.0 4.0 2.3 1.1 0.44 c 0.03 0.032 0.059 0.085 0.059 0.036 < 0.02 c 0.02	AMR 3287-95 AMR 3287-95
USA (TX), 1995 (Late Flat Dutch)	WG racemic	0.075			4	3 9 14 3 9 14	cabbage with wrapper leaves cabbage without wrapper leaves	1.8 1.9 1.4 0.83 1.4 0.11 0.043 < 0.02 < 0.02 (2) < 0.02 (2)	AMR 3287-95 AMR 3287-95
USA (NY), 1995 (Market Prize)	WG racemic	0.075			4	3 7 14 3 7 14	cabbage with wrapper leaves cabbage without wrapper leaves	1.3 1.0 0.81 0.19 0.99 0.47 0.12 0.16 0.058 0.036 0.078 < 0.02	AMR 3287-95 AMR 3287-95
USA (WI), 1995 (Grand Prize)	WG racemic	0.075			4	3 7 14 3 7 14	cabbage with wrapper leaves cabbage without wrapper leaves	0.60 1.5 0.42 1.4 0.31 0.10 0.076 0.071 0.15 0.12 < 0.02 0.039	AMR 3287-95 AMR 3287-95
USA (FL), 1996 (Fresco)	WG 3S+1R	0.075		440	4	3 7 14	cabbage with wrapper leaves	0.40 0.27 m 0.34 0.25 0.20 0.12 0.13	AMR 3731-96
USA (FL), 1996 (Fresco)	WG 3S+1R	0.075		440	4	3 7 14	cabbage without wrapper leaves	0.028 0.040 < 0.02 (2) < 0.02 (2)	AMR 3731-96
USA (WI), 1996 (Market Prize) USA (WI), 1996 (Market Prize)	WG 3S+1R WG 3S+1R	0.075 0.075		310 310	4 4	3 7 14 3 7 14	cabbage with wrapper leaves cabbage without wrapper leaves	0.27 0.14 m 0.21 0.025 0.16 0.10 0.10 < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR 3731-96 AMR 3731-96
USA (CA), 1996 (Pacifica)	WG 3S+1R	0.075		355	4	0 3 7 14 21	cabbage with wrapper leaves	2.1 2.1 1.3 4.0 m 2.7 1.6 0.54 0.44 1.1 2.6 0.69	AMR 3731-96

CABBAGES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (CA), 1996 (Pacifica)	WG 3S+1R	0.075		355	4	0 3 7 14 21	cabbage without wrapper leaves	0.054 0.39 0.076 0.032 < 0.02 0.19 0.065 < 0.02 0.098 0.022	AMR 3731-96
USA (CA), 1996 (Pacifica)	WG racemic	0.075		355	4	0 3 7 14 21	cabbage with wrapper leaves	3.4 1.9 3.9 6.4 4.0 3.4 3.1 3.0 1.8 2.3	AMR 3731-96
USA (CA), 1996 (Pacifica)	WG racemic	0.075		355	4	0 3 7 14 21	cabbage without wrapper leaves	0.44 0.090 0.32 0.16 0.28 0.12 0.078 0.098 0.18 0.096	AMR 3731-96
USA (FL), 1996 (Ramada)	WG 3S+1R	0.075		420	4	3 6 14	cabbage with wrapper leaves	0.45 0.30 m 0.38 0.17 0.22 0.060 0.059	AMR 3731-96
USA (FL), 1996 (Ramada)	WG 3S+1R	0.075		420	4	3 6 14	cabbage without wrapper leaves	0.020 0.030 < 0.02 (2) < 0.02 (2)	AMR 3731-96
USA (FL), 1996 (Ramada)	WG racemic	0.075		420	4	3 6 14	cabbage with wrapper leaves	0.43 0.50 0.68 0.46 0.40 0.23	AMR 3731-96
USA (FL), 1996 (Ramada)	WG racemic	0.075		420	4	3 6 14	cabbage without wrapper leaves	0.034 < 0.02 < 0.02 (2) < 0.02 (2)	AMR 3731-96

1/ c: sample from control plot. m: mean.
2/ Analytical results from the South African trials had been adjusted for procedural analytical recovery values.
3/ No field report.
4/ Parallel trials compared formulations based on racemic indoxacarb and indoxacarb 3S+1R.
5/ The two trials compared the effect of added wetter (0.025% and 0.125% Agral).
6/ Minimal field report.

Table 26. Indoxacarb residues in broccoli resulting from supervised trials in Australia, France, Italy, South Africa, UK and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

BROCCOLI country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 1998 (Greenbelt)	WG 3S+1R	0.075		100 -230	5	0 3 7 14 21 28	flower head	0.36 0.21 0.08 0.07 0.04 0.11	98/2377

BROCCOLI country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 1998 (Greenbelt)	WG 3S+1R	0.15		100 -230	5	0 3 7 14 21 28	flower head	0.85 0.51 0.28 < 0.02 0.08 0.06	98/2377
Australia (Qld), 1998 (Mavrick)	WG 3S+1R	0.075		600	5	1 7 4 14	flower heads	0.40 0.23 0.13 0.03	99/2212 AUJ98-009
Australia (Qld), 1998 (Mavrick)	WG 3S+1R	0.15		600	5	1 7 4 14	flower heads	0.23 0.15 0.19 0.03	99/2212 AUJ98-009
Australia (Vic), 1999	WG 3S+1R	0.075		270	4	0 7 14 21 28	flower heads	0.60 0.12 0.06 0.05 < 0.01	99/4347 9342
Australia (Vic), 1999	WG 3S+1R	0.15		270	4	0 7 14 21 28	flower heads	0.94 0.23 0.12 0.09 < 0.01	99/4347 9342
France, 2000 (Monaco)	WG 3S+1R	0.024	0.005	490	2 3	15 0 1 3	flower head	< 0.02 (2) 0.16 0.17 0.11 0.11 0.08 0.08 m 0.08	DuPont-4576
France, 2001 (Monaco)	WG 3S+1R	0.027	0.008	350	2 3	11 0 1 3	flower head	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-6061
France, 2001 (Monaco)	WG 3S+1R	0.029	0.005	540	2 3	10 0 1 3	flower head	0.02 0.03 0.09 0.12 0.06 0.05 0.04 0.04 m 0.04	DuPont-6061
Italy, 1996 (F1 Lyzard) 1/	WG racemic	0.026	0.003	830	2 3	14 0 1 3 7 14	flower heads	0.04 0.04 0.21 0.17 0.22 0.18 0.19 0.11 0.10 0.12 0.08 0.12 < 0.02 (2)	AMR 4012-96
Italy, 1996 (F1 Lyzard) 1/	WG 3S+1R	0.026	0.003	810	2 3	14 0 1 3 7 14	flower heads	< 0.02 (2) 0.18 0.14 0.13 0.13 0.06 0.06 0.06 0.06 m 0.06 0.05 0.05 < 0.02 (2)	AMR 4012-96

BROCCOLI country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
Italy, 1998 (Flash)	WG 3S+1R	0.024	0.002	990	3	1	flower head	0.13 0.14 m 0.14	AMR 5010-98
Italy, 2001 (ISI 8092)	WG 3S+1R	0.026	0.005	490	2 3	10 0 1 3	flower head	0.03 0.04 0.19 0.16 0.17 0.12 0.11 0.09 m 0.10	DuPont-6061
Italy, 2001 (Marathon)	WG 3S+1R	0.026	0.005	490	2 3	10 0 1 3	flower head	< 0.02 (2) 0.04 0.04 0.04 0.04 0.03 0.03 m 0.03	DuPont-6061
South Africa, 2001 (Green Valiant) 2/ 3/	WG 3S+1R	0.045			3	1 3 7	flower heads	0.56 0.60 0.22 0.22 m 0.22 0.15 0.12	7214/1988161/V433
South Africa, 2001 (Pirate) 2/ 3/	WG 3S+1R	0.045			3	1 3 7	flower heads	1.3 1.3 0.25 0.26 0.30 0.31 m 0.31	7214/2013500/V509
South Africa, 2001 (Pirate) 2/ 3/	WG 3S+1R	0.090			3	1 3 7	flower heads	0.54 0.52 0.96 0.92 0.41 0.38	7214/2013500/V509
UK, 1996 (Green Belt)	WG 3S+1R	0.024	0.003	840	3	3	flower heads	0.05 0.04 m 0.05	AMR 4012-96
USA (AZ), 1995 (Greenbelt)	WG racemic	0.075		190	4	3 7 14	flower head	0.67 0.38 0.15 0.24 0.096 0.10	AMR 3288-95
USA (CA), 1995 (Greenbelt NK#5)	WG racemic	0.075		360	4	3 7 14	flower head	2.3 2.0 1.3 1.3 0.30 0.45	AMR 3288-95
USA (CA), 1995 (Greenbelt)	WG racemic	0.075		280	4	3 7 14	flower head	0.85 0.93 0.41 0.86 0.10 0.042	AMR 3288-95
USA (CA), 1995 (Legend)	WG racemic	0.075		240	4	3 7 14	flower head	2.5 2.0 2.3 2.0 1.6 1.5	AMR 3288-95
USA (CA), 1996 (Marathon) 1/	WG 3S+1R	0.075		370	4	0 3 7 14 21	flower heads	0.45 0.22 0.26 0.23 m 0.25 0.25 0.17 0.076 0.16 0.062 0.092	AMR 3732-96
USA (CA), 1996 (Marathon) 1/	WG racemic	0.075		370	4	0 3 7 14 21	flower heads	0.49 0.80 0.80 0.57 0.24 0.14 0.29 0.30 0.18 0.21	AMR 3732-96

BROCCOLI country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
USA (OR), 1995 (Emerald City)	WG racemic	0.075		280	4	3 7 14	flower head	0.28 0.35 0.35 0.15 0.028 0.040	AMR 3288-95
USA (TX), 1995 (Waltham 29)	WG racemic	0.075		190	4	0 3 7 14 21	flower head	4.1 5.0 1.4 1.2 0.49 0.25 0.096 0.096 0.021 0.022 < 0.02 (2)	AMR 3288-95
USA (TX), 1996 (Southern Comet) 1/	WG 3S+1R	0.075		190	4	3 7 14	flower heads	0.26 0.52 m 0.39 0.17 0.20 0.035 0.13	AMR 3732-96
USA (TX), 1996 (Southern Comet) 1/	WG racemic	0.075		190	4	3 7 14	flower heads	0.73 0.53 0.60 0.57 0.13 0.11	AMR 3732-96

1/ Parallel trials compared formulations based on racemic indoxacarb and indoxacarb 3S+1R.
2/ Analytical results from the South African trials had been adjusted for procedural analytical recovery values.
3/ Minimal field report.
4/ m: mean.

Table 27. Indoxacarb residues in cauliflower resulting from supervised trials in Australia, Denmark, France, Germany, Greece, Italy, Netherlands, South Africa and Spain with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

CAULIFLOWER country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
Australia (NSW), 1999	WG 3S+1R	0.075		240	4	0 7 14 21 28	flower heads	0.02 < 0.01 < 0.01 < 0.01 < 0.01	99/4789 9341
Australia (NSW), 1999	WG 3S+1R	0.15		240	4	0 7 14 21 28	flower heads	0.07 < 0.02 < 0.01 < 0.01 < 0.01	99/4789 9341
Denmark, 1998 (Frimont)	WG 3S+1R	0.026	0.012	210	3	1	flower head	0.03 0.03 m 0.03	AMR 5010-98
France, 1996 (Castelgrant) 1/	WG 3S+1R	0.027	0.003	840	2 3	14 0 1 3 7 14	flower heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (4) m < 0.02 < 0.02 (2) < 0.02 (2)	AMR 4012-96

CAULIFLOWER country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 1996 (Castelgrant) 1/	WG racemic	0.026	0.003	830	2 3	14 0 1 3 7 14	flower heads	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (4) < 0.02 (2) < 0.02 (2)	AMR 4012-96
France, 1996 (Fremont) 1/	WG 3S+1R	0.026	0.003	810	2 3	14 0 1 3 3 7 14	flower heads	0.02 < 0.02 0.15 0.15 0.12 0.13 0.14 0.10 0.14 0.17 m 0.14 0.09 0.11 0.04 0.06	AMR 4012-96
France, 1996 (Fremont) 1/	WG racemic	0.026	0.003	820	2 3	14 0 1 3 7 14	flower heads	0.06 0.06 0.10 0.17 0.30 0.30 0.23 0.20 0.19 0.22 0.16 0.13 0.10 0.11	AMR 4012-96
France, 1998 (Fremon)	WG 3S+1R	0.025	0.003	810	3	1	flower head	0.05 0.05 m 0.05	AMR 5010-98
France, 1998 (Nautilus)	WG 3S+1R	0.026	0.003	830	3	1	flower head	< 0.02 (2) m < 0.02	AMR 5010-98
France, 1998 (Nautilus)	WG 3S+1R	0.027	0.003	840	3	1	flower head	< 0.02 (2) m < 0.02	AMR 5010-98
France, 2001 (Nautilus)	WG 3S+1R	0.028	0.005	520	2 3	9 0 1 3	flower head	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02	DuPont-6061
France, 2001 (Serac)	WG 3S+1R	0.027	0.005	510	2 3	14 0 1 3	flower head	< 0.02 (2) 0.02 0.02 0.02 0.02 0.01 0.01 m 0.01	DuPont-6061
Germany, 1996	WG 3S+1R	0.026	0.003	800	3	3	flower heads	< 0.02 (2) m < 0.02	AMR 4012-96
Germany, 2000 (Vinson)	WG 3S+1R	0.025	0.004	610	2 3	10 0 1 3	flower head	0.02 0.02 0.11 0.13 0.06 0.08 0.02 0.04 m 0.03	DuPont-4576
Germany, 2001 (Fremont)	WG 3S+1R	0.028	0.004	640	2 3	10 0 1 3	flower head	0.03 0.03 0.08 0.08 0.07 0.08 0.06 0.07 m 0.07	DuPont-6061
Greece, 1996 (Dominand)	WG 3S+1R	0.026	0.003	800	3	3	flower heads	< 0.02 (2) m < 0.02	AMR 4012-96

CAULIFLOWER country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 4/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Italy, 2001 (Nautilus)	WG 3S+1R	0.026	0.004	600	2 3	10 0 1 3	flower head	< 0.02 (2) 0.03 0.04 0.02 0.02 0.02 0.02 m 0.02	DuPont-6061
Netherlands, 1996 (Linday) 1/	WG 3S+1R	0.025	0.003	790	2 3	14 0 1 3 7 14	flower heads	< 0.02 (2) 0.15 0.15 0.12 0.13 0.07 0.11 m 0.09 0.05 0.09 < 0.02 (2)	AMR 4012-96
Netherlands, 1996 (Linday) 1/	WG racemic	0.026	0.003	780	2 3	14 0 1 3 7 14	flower heads	0.03 0.04 0.43 0.34 0.28 0.32 0.21 0.26 0.15 0.14 0.03 0.03	AMR 4012-96
Netherlands, 1998 (Vermont)	WG 3S+1R	0.025	0.003	810	3	1	flower head	< 0.02 (2) m < 0.02	AMR 5010-98
South Africa, 2001 2/ 3/	WG 3S+1R	0.045		320 -430	5	0 3 7	flower heads	0.07 0.07 0.04 0.04 m 0.04 0.03 0.03	7214/2021542/ V561 SABS V561
South Africa, 2001 2/	WG 3S+1R	0.090		320 -430	5	0 3 7	flower heads	0.06 0.06 0.05 0.05 0.03 0.03	7214/2021542/ V561 SABS V561
South Africa, 2001 (Star 4406) 2/ 3/	WG 3S+1R	0.045			3	0 3 7	flower heads	0.33 0.32 < 0.01 (2) m < 0.01 < 0.01 (2)	7214/2013518/ V510 SABS V510
Spain, 1996 (Aviso 112)	WG 3S+1R	0.023	0.004	555	3	3	flower heads	< 0.02 (2) m < 0.02	AMR 4012-96

1/ Parallel trials compared formulations based on racemic indoxacarb and indoxacarb 3S+1R.
2/ Analytical results from the South African trials had been adjusted for procedural analytical recovery values.
3/ Minimal field report.
4/ m: mean.

Table 28. Indoxacarb residues in Brussels sprouts resulting from supervised trials in Australia with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

BRUSSELS SPROUTS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (SA), 1999 (Ariston) Brussels sprouts	WG 3S+1R	0.075		400	4	0 7 14 21 28	sprouts sprouts sprouts sprouts sprouts	0.09 0.07 0.07 0.02 < 0.01	99/4302 9340

BRUSSELS SPROUTS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (SA), 1999 (Ariston) Brussels sprouts	WG 3S+1R	0.15		400	4	0 7 14 21 28	sprouts sprouts sprouts sprouts sprouts	0.30 0.25 0.17 0.10 0.12	99/4302 9340
Australia (SA), 1999 Brussels sprouts	WG 3S+1R	0.075		270	4	0 7 14 21 28	sprouts sprouts sprouts sprouts sprouts	0.04 0.03 0.02 < 0.02 < 0.01	99/4348 9343
Australia (SA), 1999 Brussels sprouts	WG 3S+1R	0.15		270	4	0 7 14 21 28	sprouts sprouts sprouts sprouts sprouts	0.06 0.05 0.03 < 0.02 < 0.02	99/4348 9343

Table 29. Indoxacarb residues in cucumbers and courgettes resulting from supervised trials in France, Greece, Italy and Spain with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

CUCURBITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
COURGETTE (Summer squash)									
Italy, 1998 (Frodite)	WG 3S+1R	0.049	0.005	900	6	1	fruit	0.10 0.08	AMR-5002-98
Italy, 1998 (PS 1993) Courgettes	WG 3S+1R	0.049	0.010	490	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) 0.10 0.03 0.04 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR-5002-98
CUCUMBER									
France, 1998 (Tyria) Indoor	WG 3S+1R	0.052	0.007	720	6	1	fruit	0.03 0.02 m 0.03	AMR-5002-98
France, 1998 (Tyria) Indoor	WG 3S+1R	0.051	0.006	820	6	1	fruit	0.03 0.03 m 0.03	AMR-5002-98
France, 1999 (Belouga) Plastic house	WG 3S+1R	0.038	0.004	1040	6	1	fruit	0.03 0.02 m 0.03	DuPont-2574

CUCURBITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 1999 (Noah) Plastic house	WG 3S+1R	0.037	0.004	1030	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 0.02 < 0.02 0.02 m 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-2574
France, 2000 (Défense) Plastic house	WG 3S+1R	0.036	0.005	720	6	1	fruit	< 0.02 (2) m< 0.02	DuPont-4309
France, 2000 (Ourias) Plastic house	WG 3S+1R	0.037	0.004	820	5 6	6 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-4309
Greece, 1999 (Z14) Plastic house	WG 3S+1R	0.036	0.004	980	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) 0.04 0.02 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-2574
Greece, 2000 (Z14) Plastic house	WG 3S+1R	0.037	0.004	980	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) 0.03 0.03 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-4309
Italy, 2000 (Potomac)	WG 3S+1R	0.035	0.006	600	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) 0.04 0.02 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-4303
Italy, 2000 (Prolific)	WG 3S+1R	0.034	0.006	580	6	1	fruit	< 0.02 (2) m < 0.02	DuPont-4303
Spain, 1998 (Darina) Indoor	WG 3S+1R	0.047	0.005	970	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR-5002-98
Spain, 1998 (Daser) Indoor	WG 3S+1R	0.051	0.006	910	6	1	fruit	0.05 0.05 m 0.05	AMR-5002-98
Spain, 1999 (Anico) Plastic house	WG 3S+1R	0.037	0.004	990	5 6	8 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-2574

CUCURBITS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 1999 (Stela) Plastic house	WG 3S+1R	0.037	0.004	1000	6	1	fruit	0.09 0.10 m 0.10	DuPont-2574
Spain, 2000 (Carmen F1) Plastic house	WG 3S+1R	0.036	0.005	770	6	1	fruit	0.02 < 0.02 m 0.02	DuPont-4309
Spain, 2000 (Edona)	WG 3S+1R	0.036	0.004	1000	6	1	fruit	< 0.02 (2) m < 0.02	DuPont-4303
Spain, 2000 (Suso)	WG 3S+1R	0.036	0.004	1000	5 6	7 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 (2) < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-4303

1/ m: mean.

Table 30. Indoxacarb residues in melons resulting from supervised trials in France, Greece, Italy and Spain with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

MELONS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 1999 (Lunabel)	WG	0.037	0.006	610	6	1 1 1	peel pulp fruit (calc)	0.11 0.10 < 0.02 (2) 0.05	DuPont 2575 13560 Senas
France, 1999 (Lunabel)	WG	0.037	0.004	855	5 6 5 6	7 0 1 3 5 7 7 0 1 3 5 7 1	peel pulp fruit (calc)	< 0.02 (2) 0.13 0.14 0.05 0.05 0.04 0.04 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.03	DuPont 2575 13560 Senas DuPont 2575 13560 Senas
France, 1999 (Manta) plastic house	WG	0.037	0.004	818	6	1 1 1	peel pulp fruit (calc)	0.03 0.03 < 0.02 (2) 0.024	DuPont 2576 84210 Pernes
France, 1999 (Luna Star) plastic house	WG	0.036	0.005	860	5 6	7 0 1 3 5 7	peel	< 0.02 (2) 0.10 0.05 0.05 0.04 0.04 0.03 0.02 0.03 < 0.02 0.02	DuPont 2576 13560 Senas

MELONS country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
					5 6	7 0 1 3 5 7 1	pulp fruit (calc)	< 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.03	DuPont 2576 13560 Senas
France, 2000 (Solara)	WG	0.036	0.006	607	5 6 5 6	8 0 1 3 5 7 8 0 1 3 5 7 1	peel pulp fruit (calc)	0.03 0.03 0.05 0.04 0.04 0.06 0.04 0.05 0.04 0.04 0.03 0.04 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.03	DuPont 4305 84170 Monteux DuPont 4305 84170 Monteux
France, 2000 (Lunastar) indoor	WG	0.034	0.006	580	6	1 1 1	peel pulp fruit (calc)	0.03 0.04 < 0.02 (2) 0.02	DuPont-4044 13560 Senas
France, 2000 (Heliobel)	WG	0.036	0.006	613	6	1 1 1	peel pulp fruit (calc)	0.03 0.04 < 0.02 (2) 0.02	DuPont 4305 84170 Monteux
Greece, 2000 (Galli) indoor	WG	0.036	0.004	953	5 6 5 6	7 0 1 3 5 7 7 0 1 3 5 7 1	peel pulp fruit (calc)	0.04 0.03 0.19 0.17 0.13 0.14 0.11 0.10 0.08 0.08 0.07 0.06 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.085	DuPont-4044 57019 Angelochori DuPont-4044 57019 Angelochori
Greece, 2000 (Danielle)	WG	0.038	0.004	1010	6	1 1 1	peel pulp fruit (calc)	0.05 0.05 < 0.02 (2) 0.03	DuPont 4305 57022 Vathilakos
Greece, 1999 (Galli)	WG	0.037	0.004	1035	6	1 1 1	peel pulp fruit (calc)	0.05 0.07 0.07 < 0.02 (3) 0.04	DuPont 2575 99RF013
Italy, 1999 (Baggio)	WG	0.038	0.006	633	5 6	7 0 1 3 5 7	peel	0.02 < 0.02 0.07 0.05 0.04 0.05 0.04 0.04 0.04 0.04 0.02 0.02	DuPont 2575 44022 Volania

MELONS country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
					5	7	pulp	< 0.02 (2)	DuPont 2575
					6	0		< 0.02 (2)	44022
						1		< 0.02 (2)	Volania
						3		< 0.02 (2)	
						5		< 0.02 (2)	
						7		< 0.02 (2)	
						1	fruit (calc)	0.03	
Italy, 1999 (Madras)	WG	0.036	0.004	800	6	1	peel	0.04 0.03	DuPont 2576
plastic house						1	pulp	< 0.02 (2)	97019 Vittoria
						1	fruit (calc)	0.03	
Italy, 2000 (Ramado)	WG	0.036	0.004	1020	6	1	peel	0.05 0.05	DuPont-4044
indoor						1	pulp	< 0.02 (2)	97019 Vittoria
						1	fruit (calc)	0.04	
Italy, 2000 (Baggio)	WG	0.035	0.004	796	5	7	peel	< 0.02 (2)	DuPont 4305
					6	0		0.08 0.06	44022
						1		0.04 0.05	Volania
						3		0.03 0.02	
						5		0.02 0.02	
						7		< 0.02 0.02	
					5	7	pulp	< 0.02 (2)	DuPont 4305
					6	0		< 0.02 (2)	44022
						1		< 0.02 (2)	Volania
						3		< 0.02 (2)	
						5		< 0.02 (2)	
						7		< 0.02 (2)	
						1	fruit (calc)	0.03	
Spain, 1999 (Sancho)	WG	0.039	0.005	736	5	7	peel	0.02 0.02	DuPont 2575
					6	0		0.05 0.06	46440
						1		0.07 0.05	Almussafes
						3		0.04 0.04	
						5		0.03 0.03	
						7		0.02 0.02	
					5	7	pulp	< 0.02 (2)	DuPont 2575
					6	0		< 0.02 (2)	46440
						1		< 0.02 (2)	Almussafes
						3		< 0.02 (2)	
						5		< 0.02 (2)	
						7		< 0.02 (2)	
						1	fruit (calc)	0.04	
Spain, 1999	WG	0.038	0.005	818	5	7	peel	0.03 < 0.02	DuPont 2576
(Cantasapo)					6	0		0.06 0.06	04779 Adra
plastic house						1		0.05 0.06	
						3		0.04 0.04	
						5		0.04 0.04	
						7		0.02 0.03	
					5	7	pulp	< 0.02 (2)	DuPont 2576
					6	0		< 0.02 (2)	04779 Adra
						1		< 0.02 (2)	
						3		< 0.02 (2)	
						5		< 0.02 (2)	
						7		< 0.02 (2)	
						1	fruit (calc)	0.04	

MELONS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 1999 (Aitania) plastic house	WG	0.040	0.005	860	5 6 5 6	7 0 1 3 5 7 7 0 1 3 5 7 1	peel pulp fruit (calc)	< 0.02 (2) 0.05 0.06 0.04 0.03 0.03 0.03 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.03	DuPont 2576 04700 El Ejido DuPont 2576 04700 El Ejido
Spain, 2000 (Cantagrillo) indoor	WG	0.036	0.005	750	5 6 5 6	7 0 1 3 5 7 7 0 1 3 5 7 1	peel pulp fruit (calc)	< 0.02 (2) 0.03 0.04 0.03 0.03 0.02 0.03 < 0.02 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2) 0.02	DuPont-4044 04700 El Ejido DuPont-4044 04700 El Ejido

Table 31. Indoxacarb residues in tomatoes resulting from supervised trials in Australia, France, Greece, Italy, Spain and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 2000 (Campbell CXD188)	WG 3S+1R	0.075		500	3	0 7 14 21 28	fruit	0.08 0.02 0.02 < 0.02 < 0.02	0P02884 9615
Australia (NSW), 2000 (Campbell CXD188)	WG 3S+1R	0.15		430	3	0 7 14 21	fruit	0.10 0.04 0.03 0.03	0P02884 9615
Australia (NSW), 2000 (Heinz 8704/9035)	WG 3S+1R	0.075		500	3	0 7 14 21 28	fruit	< 0.02 < 0.02 < 0.02 < 0.02 < 0.02	0P02885 9616

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 2000 (Heinz 8704/9035)	WG 3S+1R	0.15		430	3	0 7 14 21	fruit	0.04 0.03 < 0.02 0.04	0P02885 9616
Australia (Qld), 2000 (Gourmet)	WG 3S+1R	0.075		670	3	0 7 14 21	fruit	0.05 0.03 < 0.02 < 0.02	0P02737 Agrisearch 9613
Australia (Qld), 2000 (Gourmet)	WG 3S+1R	0.15		670	3	0 7 14 21	fruit	0.08 0.03 0.02 0.02	0P02737 Agrisearch 9613
Australia (Qld), 2000 (Gourmet)	WG 3S+1R	0.075		270	3	0 3 7 14	fruit	0.18 0.12 0.11 0.06	0P03628 9614
Australia (Qld), 2000 (Gourmet)	WG 3S+1R	0.15		270	3	0 3 7 14	fruit	0.21 0.17 0.09 0.08	0P03628 9614
Australia (Vic), 2000 (Heinz 9035)	WG 3S+1R	0.075		520	3	0 7 14 21 28	fruit	0.08 0.05 0.05 0.05 < 0.02	0P02883 9617
Australia (Vic), 2000 (Heinz 9035)	WG 3S+1R	0.15		520	3	0 7 14 21	fruit	0.09 0.11 0.11 0.06	0P02883 9617
Australia (Vic), 2000 (SPS Hypeel 696)	WG 3S+1R	0.075		520	3	0 7 14	fruit	0.06 0.05 0.02	0P02882 9618
Australia (Vic), 2000 (SPS Hypeel 696)	WG 3S+1R	0.15		520	3	0 7 14	fruit	0.07 0.06 0.06	0P02882 9618
Australia (Vic), 2001 (Grenade)	WG 3S+1R	0.075		450	3	0 3 7 14 21	fruit	0.07 0.09 0.06 0.04 < 0.02	1P00995 Agrisearch 0511
Australia (Vic), 2001 (Grenade)	WG 3S+1R	0.15		450	3	0 3 7 14 21	fruit	0.12 0.14 0.10 0.06 0.03	1P00995 Agrisearch 0511

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 1998 (Delphine)	WG 3S+1R	0.037	0.003	1130	5 6	9 0 1 3 5 7	fruit	< 0.02 (2) < 0.02 0.05 < 0.02 (2) < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2)	AMR 5013-98
France, 1998 (Delphine)	SC 3S+1R	0.038	0.003	1160	5 6	9 0 1 3 5 7	fruit	< 0.02 (2) 0.02 0.02 < 0.02 0.02 < 0.02 (2) m ≤ 0.02 < 0.02 (2) < 0.02 (2)	AMR 5013-98
France, 1998 (Nautilo)	WG 3S+1R	0.037	0.007	525	5 6	10 0 1 3 5 7	fruit	0.03 0.02 0.06 0.07 0.05 0.05 0.04 0.05 m 0.05 0.03 0.03 < 0.02 (2)	AMR 5013-98
France, 1998 (Nautilo)	SC 3S+1R	0.038	0.007	530	5 6	10 0 1 3 5 7	fruit	0.03 0.03 0.07 0.07 0.06 0.04 0.05 0.04 m 0.05 0.04 0.03 < 0.02 0.02	AMR 5013-98
France, 1999 (Canery Row)	WG 3S+1R	0.037	0.007	550	5 6	10 0 1 3 5 7	fruit	< 0.02 (2) 0.04 0.07 0.02 0.03 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2)	DuPont-2583
France, 1999 (Isabella) Plastic house	WG 3S+1R	0.037	0.004	1020	6	1	fruit	0.02 0.02 m 0.02	DuPont-2584
France, 1999 (Labelle) Plastic house	WG 3S+1R	0.038	0.004	1040	5 6	10 0 1 3 5 7	fruit	0.05 0.06 0.09 0.11 0.07 0.06 m 0.07 0.06 0.05 0.06 0.05 0.04 0.03	DuPont-2584
France, 1999 (Promo)	WG 3S+1R	0.036	0.004	820	6	1	fruit	< 0.02 (2) m < 0.02	DuPont-2583
France, 2000 (Cannery Row)	WG 3S+1R	0.036	0.006	610	6	1	fruit	0.04 0.06 m 0.05	DuPont-4307
France, 2000 (Cannery Row)	WG 3S+1R	0.036	0.006	610	5 6	10 0 1 3 5 7	fruit	0.02 0.02 0.05 0.06 0.04 0.03 0.03 0.03 m 0.03 0.02 0.02 0.02 0.02	DuPont-4307

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 2000 (Isabella) Plastic house	WG 3S+1R	0.035	0.004	990	5 6	11 0 1 3 5 7	fruit	0.03 0.03 0.12 0.08 0.07 0.06 m 0.07 0.05 0.05 0.04 0.04 < 0.02 (2)	DuPont-4304
France, 2000 (Tamaris) Plastic house	WG 3S+1R	0.036	0.004	1010	6	1	fruit	< 0.02 0.02 m 0.02	DuPont-4304
Greece, 1999 (622) Plastic house	WG 3S+1R	0.036	0.004	1000	5 6	8 0 1 3 5 7	fruit	0.02 < 0.02 0.03 0.03 0.02 0.02 0.02 0.02 m 0.02 < 0.02 (2) < 0.02 (2)	DuPont-2584
Greece, 1999 (Galli)	WG 3S+1R	0.036	0.004	1000	5 6	10 0 1 3 5 7	fruit	< 0.02 0.03 0.03 0.03 < 0.02 0.02 0.03 0.03 0.04 m 0.03 0.02 < 0.02 0.03 < 0.02 (3) < 0.02 0.04 0.04	DuPont-2583
Greece, 2000 (534) Plastic house	WG 3S+1R	0.037	0.004	990	5 6	9 0 1 3 5 7	fruit	0.02 0.02 0.06 0.07 0.04 0.04 m 0.04 0.04 0.04 0.04 0.04 0.03 0.03	DuPont-4304
Italy, 1999 (Incas)	WG 3S+1R	0.035	0.006	570	6	1	fruit	0.02 0.03 m 0.03	DuPont-2583
Italy, 1999 (Loni)	WG 3S+1R	0.036	0.004	900	5 6	10 0 1 3 5 7	fruit	< 0.02 (2) 0.05 0.09 0.03 0.03 m 0.03 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-2583
Italy, 2000 (Incas)	WG 3S+1R	0.037	0.004	940	6	1	fruit	0.06 0.08 m 0.07	DuPont-4307
Italy, 2000 (PS 1296, Peto)	WG 3S+1R	0.035	0.006	590	5 6	11 0 1 3 5 7	fruit	0.02 0.02 0.05 0.06 0.04 0.04 m 0.04 0.04 0.04 0.03 0.04 0.03 0.03	DuPont-4307
Spain, 1999 (Marmande R.A.F.) Plastic house	WG 3S+1R	0.036	0.004	960	6	1	fruit	< 0.02 (2) m < 0.02	DuPont-2584

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 1999 (Vica) Plastic house	WG 3S+1R	0.037	0.004	1000	5 6	8 0 1 3 5 7	fruit	0.02 0.02 0.03 0.03 0.03 0.03 m 0.03 0.03 0.02 < 0.02 (2) < 0.02 (2)	DuPont-2584
Spain, 2000 (Antillas) Plastic house	WG 3S+1R	0.036	0.004	970	6	1	fruit	0.04 0.03 m 0.04	DuPont-4304
USA (PA), 1995 (Better Boy)	WG racemic	0.075			4	3 7 14	fruit	0.18 0.18 0.064 0.13 0.071 0.077	AMR 3289-95
USA (MD), 1995 (Hypeel 696)	WG racemic	0.075			4	3 7 14	fruit	0.19 0.41 0.17 0.53 0.29 0.22 0.28 0.16	AMR 3289-95
USA (FL), 1995 (Sunny)	WG racemic	0.075			4	3 7 14	fruit	0.079 0.14 0.13 0.056 0.030 0.025	AMR 3289-95
USA (FL), 1995 (Solarset)	WG racemic	0.075			4	0 1 3 5 7 14 24	fruit	0.051 0.10 0.035 0.028 0.033 0.041 0.045 < 0.02 0.030 < 0.02 < 0.02 (2) < 0.02 0.032	AMR 3289-95
USA (IN), 1995 (Peto 696)	WG racemic	0.075			4	4 7 14	fruit	0.22 0.43 0.35 0.22 0.11 0.34	AMR 3289-95
USA (CA), 1995 (8892)	WG racemic	0.075			4	3 7 14	fruit	0.14 0.16 0.21 0.42 0.23 0.30	AMR 3289-95
USA (CA), 1995 (3155)	WG racemic	0.075			4	3 7 14	fruit	0.054 0.064 0.049 0.066 0.056 0.076	AMR 3289-95
USA (CA), 1995 (Peel Mech)	WG racemic	0.075			4	3 7 14	fruit	0.20 0.17 0.10 0.15 0.18 0.063	AMR 3289-95
USA (CA), 1995 (8892 Heinz)	WG racemic	0.075			4	3 7 14	fruit	0.14 0.060 0.079 0.057 0.048 0.13	AMR 3289-95
USA (CA), 1995 (Brigade)	WG racemic	0.075			4	3 7 14	fruit	0.059 0.087 0.068 0.028 0.027 0.036	AMR 3289-95

TOMATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (CA), 1995 (Cal Ace)	WG racemic	0.075			4	0 1 3 5 7 14 21	fruit	0.45 0.47 0.15 0.22 0.27 0.35 0.42 0.36 0.16 0.31 0.44 0.38 0.19 0.19	AMR 3289-95
USA (CA), 1995 (Shady Lady)	WG 3S+1R	0.075			4	0 1 3 5 7 14 21	fruit	0.21 0.088 0.25 0.36 0.17 0.061 0.072 0.15 0.11 0.34 0.24 0.36 m 0.30 0.27 0.22	AMR 3289-95
USA (FL), 1996 (Agriset)	WG 3S+1R	0.075			4	0 3 7 14 22	fruit	0.052 0.024 < 0.02 0.02 m 0.02 < 0.02 0.02 < 0.02 (2) < 0.02 (2)	AMR 3733-96
USA (IN), 1996 (TR-12)	WG 3S+1R	0.075			4	3 7 14	fruit	0.035 0.045 0.052 0.046 m 0.049 0.037 0.035	AMR 3733-96
USA (IN), 1996 (TR-12)	WG racemic	0.075			4	3 7 14	fruit	0.081 0.072 0.11 0.081 0.097 0.097	AMR 3733-96
USA (CA), 1996 (Heinz 8892)	WG 3S+1R	0.075			4	3 7 14	fruit	0.038 0.067 0.050 0.065 m 0.058 0.042 < 0.02	AMR 3733-96
USA (CA), 1996 (Heinz 8892)	WG racemic	0.075			4	3 7 14	fruit	< 0.02 (2) 0.22 < 0.02 < 0.02 0.11	AMR 3733-96
USA (CA), 1996 (Halley 3155)	WG 3S+1R	0.075			4	0 3 7 14 21	fruit	0.11 0.11 0.13 0.13 m 0.13 0.038 0.030 0.073 0.10 0.050 0.032	AMR 3733-96
USA (CA), 1996 (Halley 3155)	WG racemic	0.075			4	0 3 7 14 21	fruit	0.16 < 0.02 0.16 0.12 < 0.02 0.092 < 0.02 (2) 0.036 < 0.02	AMR 3733-96
USA (CA), 1995 (Cal Ace)	WG racemic	0.074		250	4	3	fruit	0.18 0.14	AMR 3290-95
USA (CA), 1996 (Halley 3155)	WG 3S+1R	0.075		360	4	3	fruit	0.12 0.14 m 0.13	AMR 3734-96

1/ m: mean.

Table 32. Indoxacarb residues in peppers resulting from supervised trials in Australia, France, Greece, Italy, Portugal, Spain and USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

PEPPERS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Qld), 2000 (Capsicum, Aeries)	WG 3S+1R	0.051		1000	3	0 3 7 14	fruit	0.02 < 0.02 < 0.02 < 0.02	1P00188
Australia (Qld), 2000 (Capsicum, Aeries)	WG 3S+1R	0.10		1000	3	0 3 7 14	fruit	0.03 0.03 0.03 < 0.02	1P00188
Australia (Qld), 2000 (Capsicum, Airies)	WG 3S+1R	0.075		320	3	0 3 7 14 21	fruit	0.37 0.41 0.27 0.13 0.10	1P00811 0512
Australia (Qld), 2000 (Capsicum, Airies)	WG 3S+1R	0.15		320	3	0 3 7 14 21	fruit	0.70 0.40 0.19 0.14 0.10	1P00811 0512
Australia (SA), 2000 (Capsicum, Yaspo)	WG 3S+1R	0.075		400	3	0 3 7 14 21	fruit	0.15 0.06 0.04 < 0.01 < 0.01	1P00621 0513
Australia (SA), 2000 (Capsicum, Yaspo)	WG 3S+1R	0.15		400	3	0 3 7 14 21	fruit	0.12 0.04 0.04 0.04 < 0.01	1P00621 0513
Australia (Vic), 2001 (Capsicum, Target)	WG 3S+1R	0.075		520	3	0 3 7 14 21	fruit	0.06 0.03 0.03 0.07 < 0.01	1P00996 0514
Australia (Vic), 2001 (Capsicum, Target)	WG 3S+1R	0.15		520	3	0 3 7 14 21	fruit	0.20 0.20 0.03 < 0.02 < 0.01	1P00996 0514
France, 1999 (Clovis)	WG 3S+1R	0.038	0.005	720	6	1	fruit	< 0.02 (2) m < 0.02	DuPont-2585
France, 1999 (Mariner) Plastic house	WG 3S+1R	0.038	0.004	1050	6	1	fruit	< 0.02 (2) m ≤ 0.02	DuPont-2586

PEPPERS country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
France, 1999 (Mariner) Plastic house	WG 3S+1R	0.038	0.004	1040	5 6	10 0 1 3 5 7	fruit	< 0.02 (2) 0.03 < 0.02 < 0.02 (2) m < 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-2586
France, 2000 (Anibal) Plastic house	WG 3S+1R	0.037	0.006	620	5 6	11 0 1 3 5 7	fruit	< 0.02 (2) 0.07 0.06 0.02 0.02 m 0.02 < 0.02 (2) < 0.02 (2) < 0.02 (2)	DuPont-4302
France, 2000 (Clovis)	WG 3S+1R	0.037	0.006	630	6	1	fruit	< 0.02 (2) m ≤ 0.02	DuPont-4306
Greece, 1999 (Balo)	WG 3S+1R	0.037	0.004	1030	5 6	10 0 1 3 5 7	fruit	< 0.02 (3) 0.03 0.03 0.03 0.03 0.02 0.03 0.03 0.02 0.04 m 0.03 0.03 0.02 < 0.02 < 0.02 (3)	DuPont-2585
Greece, 1999 (Dolmi) Plastic house	WG 3S+1R	0.038	0.004	1040	6	1	fruit	0.06 0.06 m 0.06	DuPont-2586
Greece, 2000 (P-14) Plastic house	WG 3S+1R	0.036	0.004	970	6	1	fruit	0.20 0.21 m 0.21	DuPont-4302
Greece, 2000 (Sweet, P, local cultivar)	WG 3S+1R	0.037	0.004	920	5 6	11 0 1 3 5 7	fruit	0.04 0.02 0.06 0.10 0.05 0.05 m 0.05 0.04 0.03 0.04 0.04 0.04 0.02	DuPont-4306
Italy, 1999 (Ecotipo Foggia)	WG 3S+1R	0.036	0.005	690	6	1	fruit	< 0.02 (2) m ≤ 0.02	DuPont-2585
Italy, 1999 (Tango)	WG 3S+1R	0.036	0.004	1000	5 6	9 0 1 3 5 7	fruit	0.03 0.03 0.06 0.06 0.05 0.04 m 0.05 0.04 0.04 0.04 0.03 0.03 0.03	DuPont-2585
Italy, 2000 (Valdor)	WG 3S+1R	0.038	0.004	950	6	1	fruit	0.05 0.05 m 0.05	DuPont-4306
Portugal, 1998 (Lamuyo F1)	WG 3S+1R	0.038	0.005	720	6	1	fruit	0.03 0.04 m 0.04	AMR 5014-98
Spain, 1998 (Italico)	WG 3S+1R	0.035	0.004	970	6	1	fruit	0.06 0.06 m 0.06	AMR 5014-98

PEPPERS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 1999 (Cuzco) Plastic house	WG 3S+1R	0.037	0.004	990	5 6	11 0 1 3 5 7	fruit	< 0.02 (2) 0.04 0.05 0.03 0.04 m 0.04 0.03 0.03 0.02 0.03 < 0.02 (2)	DuPont-2586
Spain, 1999 (Italico)	WG 3S+1R	0.036	0.004	990	5 6	9 0 1 3 5 7	fruit	0.03 0.03 0.08 0.08 0.08 0.07 m 0.08 0.06 0.07 0.05 0.06 < 0.02 0.02	DuPont-2585
Spain, 1999 (Lipari) Plastic house	WG 3S+1R	0.038	0.004	1020	5 6	10 0 1 3 5 7	fruit	0.08 0.03 0.10 0.14 0.09 0.08 m 0.09 0.08 0.07 0.06 0.06 0.04 0.05	DuPont-2586
Spain, 1999 (Negrillo)	WG 3S+1R	0.037	0.004	1000	6	1	fruit	0.19 0.18 m 0.19	DuPont-2585
Spain, 2000 (Sweet, Anibal)	WG 3S+1R	0.034	0.004	970	5 6	10 0 1 3 5 7	fruit	0.02 < 0.02 0.03 0.03 0.03 0.03 m 0.03 0.02 0.02 0.02 < 0.02 < 0.02 (2)	DuPont-4306
Spain, 2000 (Sweet, Italico) Plastic house	WG 3S+1R	0.038	0.004	1000	6	1	fruit	0.05 0.03 m 0.04	DuPont-4302
Spain, 2000 (Sweet, Mariner) Plastic house	WG 3S+1R	0.038	0.004	930	5 6	9 0 1 3 5 7	fruit	0.08 0.08 0.12 0.11 0.09 0.09 m 0.09 0.08 0.08 0.06 0.07 0.06 0.05	DuPont-4302
USA (CA), 1996 (Bell pepper, Cal Wonder)	WG 3S+1R	0.075		280	4	0 2 7 14 21	fruit	0.062 0.090 0.026 0.021 0.056 0.077 m 0.067 0.048 0.065 0.039 0.030	AMR 3735-96
USA (CA), 1996 (Bell pepper, Yolo Wonder)	WG 3S+1R	0.075		640	4	3 7 14	fruit	0.072 0.079 m 0.076 0.091 0.059 0.027 0.027	AMR 3735-96
USA (FL), 1996 (Bell pepper, Capistrano)	WG 3S+1R	0.075		430	4	3 7 14	fruit	< 0.02 (2) m ≤ 0.02 < 0.02 (2) < 0.02 (2)	AMR 3735-96

PEPPERS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (FL), 1996 (Non-bell pepper, Cayenne)	WG 3S+1R	0.075		450	4	3 7 14	fruit	< 0.02 (2) m ≤ 0.02 < 0.02 (2) < 0.02 (2)	AMR 3735-96
USA (FL), 1997 (Bell pepper, Capistrano)	WG 3S+1R	0.075		500	4	3 7 14	fruit	< 0.02 0.02 m 0.02 0.034 < 0.02 < 0.02 (2)	AMR 3735-96
USA (FL), 1997 (Non-bell pepper, Jalapeño)	WG 3S+1R	0.075		500	4	3 7 14	fruit	0.093 0.099 m 0.096 0.048 0.037 0.024 0.040	AMR 3735-96
USA (NC), 1996 (Bell pepper, Capistrano)	WG 3S+1R	0.075		47	4	3 7 14	fruit	< 0.02 0.021 m 0.020 < 0.02 (2) < 0.02 (2)	AMR 3735-96
USA (OH), 1996 (Bell pepper, Northstar)	WG 3S+1R	0.075		200	4	3 7 14	fruit	< 0.02 (2) m ≤ 0.02 0.027 0.029 < 0.02 (2)	AMR 3735-96
USA (TX), 1996 (Non-bell pepper, Anaheim)	WG 3S+1R	0.075		190	4	3 7 13	fruit	0.039 0.041 m 0.040 0.021, 0.040 < 0.02 (2)	AMR 3735-96

1/ m: mean.

Table 33. Indoxacarb residues in sweet corn resulting from supervised trials in USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

SWEET CORN country, year (variety)	Application					PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (NY), 1995 (Crusader)	WG racemic	0.075		230	4	3 14 21	K+CWHR	< 0.01 0.012 m 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (MD), 1995 (Seneca Horizon)	WG racemic	0.075		310	4	3 14 21	K+CWHR	< 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (FL), 1995 (Silver Queen)	WG racemic	0.075		470	4	0 1 3 7 14 21	K+CWHR 2/	0.013 < 0.01 < 0.01 (2) < 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (MN), 1995 (Earligold)	WG racemic	0.075		190	4	3 14 21	K+CWHR	< 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95

SWEET CORN country, year (variety)	Application					PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (IL), 1995 (Illinios Xtra-sweet)	WG racemic	0.075		220	4	3 14 21	K+CWHR	< 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (CA), 1995 (Silver Queen)	WG racemic	0.075		260	4	0 1 3 7 14 21	K+CWHR	< 0.01 (2) < 0.01 (2) < 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2) < 0.#01 (2)	AMR 3291-95
USA (OR), 1995 (Jubilee)	WG racemic	0.075		370	4	3 14 21	K+CWHR	≤ 0.01 (2) m < 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (WA), 1995 (Golden Jubilee)	WG racemic	0.075		65	4	3 17 24	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3291-95
USA (MD), 1996 (Seneca Horizon)	WG 3S+1R	0.075		630	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (IL), 1996 (Fortune)	WG 3S+1R	0.075		220	4	0 1 3 7 14	K+CWHR	< 0.01 (2) < 0.01 (2) < 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (IL), 1996 (Fortune)	WG racemic	0.075		220	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (MN), 1996 (Earlivee)	WG 3S+1R	0.075		190	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (MN), 1996 (Earlivee)	WG racemic	0.075		190	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (IN), 1996 (Bodacious)	WG 3S+1R	0.075		220	4	3 7 14	K+CWHR	≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (IN), 1996 (Bodacious)	WG racemic	0.075		220	4	3 7 14	K+CWHR	≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (WI), 1996 (Tuxedo)	WG 3S+1R	0.075		300	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96
USA (WI), 1996 (Tuxedo)	WG racemic	0.075		300	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96

SWEET CORN country, year (variety)	Application					PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer 3/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (CA), 1996 (Silver Queen)	WG 3S+1R	0.075		250	4	3 7 14	K+CWHR	< 0.01 (2) m ≤ 0.01 < 0.01 (2) < 0.01 (2)	AMR 3737-96

1/ K+CWHR: kernel + cob with husk removed.
2/ AMR 3291-95. Sweet corn. Crop harvested 21 days after treatment and dried in a greenhouse for 12 days before sampling.
3/ m: mean

Table 34. Indoxacarb residues in lettuce resulting from supervised trials in France, Greece, Italy, Spain and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

LETTUCE country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 1998 (Divina)	WG 3S+1R	0.039	0.008	520	5 6	7 0 1 3 5 7	head	0.17 0.14 0.91 0.74 0.42 0.68 m 0.55 0.34 0.38 0.23 0.24 0.19 0.21	AMR 5006-98
France, 1999 (Bougy)	WG 3S+1R	0.036	0.008	440	6	1	head	0.56 0.48 m 0.52	DuPont-2577
France, 1999 (Christine)	WG 3S+1R	0.037	0.008	470	5 6	7 0 1 3 5 7	head	0.29 0.25 0.96 0.93 0.82 0.90 m 0.86 0.67 0.82 0.46 0.44 0.40 0.37	DuPont-2577
Greece, 2000 (Romana)	WG 3S+1R	0.036	0.009	390	5 6	6 0 1 3 5 7	head	0.44 0.43 1.8 1.7 1.7 1.6 m 1.7 1.4 1.1 0.84 0.99 0.63 0.56	DuPont-2577
Italy, 1998 (Grintaus)	WG 3S+1R	0.036	0.005	800	6	1	head	0.75 1.0 m 0.88	AMR 5006-98
Italy, 1998 (Iceberg)	WG 3S+1R	0.036	0.005	800	5 6	7 0 1 3 5 7	head	0.09 0.10 0.18 0.23 0.15 0.17 m 0.16 0.10 0.10 0.05 0.07 0.02 0.03	AMR 5006-98
Spain, 1998 (Mikel R2)	WG 3S+1R	0.038	0.004	880	6	1	head	0.17 0.20 m 0.19	AMR 5006-98

LETTUCE country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 1998 (Mikel RZ)	WG 3S+1R	0.037	0.006	610	5 6	7 0 1 3 5 7	head	0.09 0.07 0.38 0.44 0.25 0.25 m 0.25 0.16 0.19 0.13 0.16 0.07 0.05	AMR 5006-98
Spain, 1999 (Head lettuce, Iceberg)	WG 3S+1R	0.038	0.007	510	6	1	head	0.44 0.34 m 0.39	DuPont-2577
Spain, 1999 (Head lettuce, Iceberg-Legion)	WG 3S+1R	0.039	0.008	520	5 6	7 0 1 3 5 7	head	0.33 0.35 1.1 1.5 0.50 0.53 m 0.52 0.33 0.45 0.10 0.13 0.05 0.05	DuPont-2577
USA (FL), 1997 (Head lettuce, Iceberg)	WG 3S+1R	0.075		450	4	3 7 14 3 7 14	lettuce with wrapper leaves -without	2.1 1.6 1.2 1.3 0.12 0.059 0.55 0.30 0.081 0.25 < 0.02 (2)	AMR 3728-96
USA (MD), 1996 (Head lettuce, Summertime)	WG 3S+1R	0.075		330	4	0 3 7 14 21 0 3 7 14 21	lettuce with wrapper leaves -without	2.7 2.9 1.7 2.2 0.83 0.97 0.74 0.38 0.26 0.21 0.23 0.15 < 0.02 (2) < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR 3728-96
USA (MD), 1996 (Head lettuce, Summertime)	WG racemic	0.075		330	4	0 3 7 14 21 0 3 7 14 21	lettuce with wrapper leaves -without	3.5 3.5 2.7 3.7 2.3 2.8 1.7 1.0 0.60 0.66 0.16 0.10 < 0.02 0.034 < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR 3728-96
USA (AZ), 1996 (Head lettuce, Winterhaven)	WG 3S+1R	0.075		190	4	3 7 14 3 7 14	lettuce with wrapper leaves -without	1.7 1.5 1.9 1.6 1.1 1.5 0.25 0.29 0.12 0.25 0.17 0.11	AMR 3728-96

LETTUCE country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
USA (AZ), 1996 (Head lettuce, Winterhaven)	WG racemic	0.075		190	4	3 7 14 3 7 14	lettuce with wrapper leaves -without	2.6 2.2 1.6 1.8 1.7 0.085 0.74 0.15 < 0.02 0.17 0.32 1.4	AMR 3728-96
USA (CA), 1997 (Head lettuce, Diamond)	WG 3S+1R	0.075		370	4	3 7 14 3 7 14	lettuce with wrapper leaves -without	0.18 0.22 0.12 0.033 0.034 0.020 < 0.02 (2) < 0.02 (2) < 0.02 (2)	AMR 3728-96
USA (CA), 1997 (Head lettuce, Diamond)	WG racemic	0.075		370	4	3 7 14 3 7 14	lettuce with wrapper leaves -without	0.25 0.40 0.056 0.081 0.021 0.042 0.029 0.033 < 0.02 (2) 0.027 < 0.02	AMR 3728-96
USA (FL), 1997 (Leaf lettuce, Tall Guzemaine)	WG 3S+1R	0.075		450	4	0 3 7 14 21	leaf lettuce	5.2 4.6 3.4 4.2 3.5 3.6 0.062 0.10 0.032 < 0.02	AMR 3728-96
USA (FL), 1997 (Leaf lettuce, Tall Guzemaine)	WG racemic	0.075		450	4	0 3 7 14 21	leaf lettuce	10 8.2 7.9 7.2 4.8 6.3 0.14 0.097 0.063 0.059	AMR 3728-96
USA (AZ), 1997 (Leaf lettuce, Royal Green)	WG 3S+1R	0.075		140	4	3 7 14	leaf lettuce	3.6 2.8 3.0 3.5 1.5 2.1	AMR 3728-96
USA (AZ), 1997 (Leaf lettuce, Royal Green)	WG racemic	0.075		140	4	3 7 14	leaf lettuce	6.0 7.1 4.2 5.2 2.6 2.2	AMR 3728-96
USA (MD), 1999 (Head lettuce, Summertime)	WG 3S+1R	0.12		340	4	3	lettuce with wrapper leaves -without	1.9 2.6 m 2.3 0.033 0.016	DuPont-1414
USA (FL), 1999 (Head lettuce, Raleigh)	WG 3S+1R	0.12		470	4	3	lettuce with wrapper leaves -without	2.4 2.6 m 2.5 0.067 0.082	DuPont-1414
USA (NM), 1998 (Head lettuce, Cool Green M.I.)	WG 3S+1R	0.12		270	4	3	lettuce with wrapper leaves -without	0.81 0.40 m 0.61 0.051 0.044	DuPont-1414
USA (CA), 1999 (Head lettuce, Early Giant)	WG 3S+1R	0.12		280	4	3	lettuce with wrapper leaves -without	2.8 2.5 m 2.7 0.14 0.24	DuPont-1414

LETTUCE country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (CA), 1998 (Head lettuce, Diamond)	WG 3S+1R	0.12		190	4	3	lettuce with wrapper leaves -without	2.4 1.1 m 1.8 0.061 0.047	DuPont-1414
USA (CA), 1999 (Head lettuce, Sharp-shooter)	WG 3S+1R	0.12		370	4	3	lettuce with wrapper leaves -without	3.5 4.0 m 3.8 0.11 0.029	DuPont-1414
USA (CA), 1998 (Head lettuce, Salinas, M.I.)	WG 3S+1R	0.12		370	4	3	lettuce with wrapper leaves -without	4.4 3.6 m 4.0 0.48 0.34	DuPont-1414
USA (CA), 1998 (Head lettuce, Valley Green)	WG 3S+1R	0.12		190	4	3	lettuce with wrapper leaves -without	3.3 3.1 m 3.2 0.13 0.24	DuPont-1414
USA (AZ), 1999 (Head lettuce, Cibola)	WG 3S+1R	0.12		190	4	3	lettuce with wrapper leaves -without	4.4 4.1 m 4.3 1.1 0.76	DuPont-1414
USA (MD), 1998 (Leaf lettuce, Waldman's Green)	WG 3S+1R	0.12		340	4	3	leaf lettuce	8.0 8.7 m 8.4	DuPont-1414
USA (FL), 1999 (Leaf lettuce, Rouge)	WG 3S+1R	0.12		470	4	3	leaf lettuce	6.8 7.9 m 7.4	DuPont-1414
USA (AZ), 1999 (Leaf lettuce, Green Vision)	WG 3S+1R	0.12		190	4	3	leaf lettuce	6.6 5.6 m 6.1	DuPont-1414
USA (CA), 1999 (Leaf lettuce, Genie Green)	WG 3S+1R	0.12		370	4	3	leaf lettuce	3.5 4.6 m 4.1	DuPont-1414
USA (CA), 1998 (Leaf lettuce, Darkland Romaine)	WG 3S+1R	0.12		230	4	3	leaf lettuce	6.6 7.7 m 7.2	DuPont-1414
USA (CA), 1998 (Leaf lettuce, Waldeman's Green)	WG 3S+1R	0.12		280	4	3	leaf lettuce	5.9 7.2 m 6.6	DuPont-1414
USA (CA), 1998 (Leaf lettuce, Savannah Green M.I.)	WG 3S+1R	0.12		370	4	3	leaf lettuce	8.3 8.1 m 8.2	DuPont-1414
USA (AZ), 1998 (Leaf lettuce, Margarita MT)	WG 3S+1R	0.12		94	4	3	leaf lettuce	3.4 3.7 m 3.6	DuPont-1414
USA (CA), 1998 (Leaf lettuce, Romaine)	WG 3S+1R	0.12		280	4	3	leaf lettuce	2.7 2.9 m 2.8	DuPont-1414

1/ m: mean

Table 35. Indoxacarb residues in pulses (adzuki beans, chickpeas and mung beans) resulting from supervised trials in Australia with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

PULSES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
ADZUKI BEANS									
Australia (NSW), 2002 (Erimo)	SC 3S+1R	0.060		200	1	28	adzuki beans	< 0.01	2E3211 AUE02001
Australia (NSW), 2002 (Erimo)	SC 3S+1R	0.12		200	1	28	adzuki beans	< 0.02	2E3211 AUE02001
Australia (NSW), 2002 (Erimo)	SC 3S+1R	0.060		200	1	25	adzuki beans	0.02	2E3211 AUE02002
Australia (NSW), 2002 (Erimo)	SC 3S+1R	0.12		200	1	25	adzuki beans	0.05	2E3211 AUE02002
CHICKPEAS									
Australia (NSW), 2000 (Amethyst)	SC 3S+1R	0.045		125	1	28	chickpea grain	0.02	0P04946 AUJ-99-019
Australia (NSW), 2000 (Amethyst)	SC 3S+1R	0.090		125	1	28	chickpea grain	0.23	0P04946 AUJ-99-019
Australia (Qld), 2000 (Barwon)	SC 3S+1R	0.045		125	1	29	chickpea grain	< 0.01	0P04947 AUJ-99-018
Australia (Qld), 2000 (Barwon)	SC 3S+1R	0.090		125	1	29	chickpea grain	< 0.02	0P04947 AUJ-99-018
Australia (NSW), 1999 (Amethyst)	SC 3S+1R	0.045		90	1	28	chickpea grain	0.13	99/5805 AUJ-99-014
Australia (NSW), 1999 (Amethyst)	SC 3S+1R	0.090		90	1	28	chickpea grain	0.14	99/5805 AUJ-99-014
Australia (Qld), 1999 (Amethyst)	SC 3S+1R	0.045		100	1	28	chickpea grain	0.02	99/5806 AUJ-99-015
Australia (Qld), 1999 (Amethyst)	SC 3S+1R	0.090		100	1	28	chickpea grain	0.02	99/5806 AUJ-99-015
MUNGBEANS									
Australia (Qld), 2000 (Emerald)	SC 3S+1R	0.060		98	1	28	mungbean grain	0.02	1P00833 0449
Australia (Qld), 2000 (Emerald)	SC 3S+1R	0.090		98	1	28	mungbean grain	0.04	1P00833 0449
Australia (Qld), 2000 (Green Diamond)	SC 3S+1R	0.060		100	1	28	mungbean grain	< 0.01	0P04943 AUJ-00-010

PULSES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (Qld), 2000 (Green Diamond)	SC 3S+1R	0.090		100	1	28	mungbean grain	< 0.01	0P04943 AUJ-00-010
Australia (NSW), 2000 (Emerald)	SC 3S+1R	0.060		80	1	28	mungbean grain	< 0.01	0P04942 AUJ-00-022
Australia (NSW), 2000 (Emerald)	SC 3S+1R	0.090		80	1	28	mungbean grain	< 0.01	0P04942 AUJ-00-022

Table 36. Indoxacarb residues in soybeans resulting from supervised trials in Australia and USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

SOYBEANS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Australia (NSW), 2000 (Dragon)	SC 3S+1R	0.060		80	1	28	soybean grain	< 0.01	0P04940 AUJ-00-023
Australia (NSW), 2000 (Dragon)	SC 3S+1R	0.090		80	1	28	soybean grain	< 0.01	0P04940 AUJ-00-023
Australia (Qld), 2000 (Koana)	SC 3S+1R	0.060		100	1	29	soybean grain	< 0.01	0P04941 AUJ-00-014
Australia (Qld), 2000 (Koana)	SC 3S+1R	0.090		100	1	29	soybean grain	< 0.01	0P04941 AUJ-00-014
Australia (Qld), 2000 (Leichardt)	SC 3S+1R	0.060		120	1	27	soybean grain	0.08 0.03 m 0.055	1P00834 0448
Australia (Qld), 2000 (Leichardt)	SC 3S+1R	0.12		120	1	27	soybean grain	0.07 0.05	1P00834 0448
USA (AR), 1998 (Asgrow 5901)	SC 3S+1R	0.12		94	4	21	soybean grain	0.29 0.28 m 0.29	AMR 4917-98
USA (IA), 1998 (NK 30-06)	SC 3S+1R	0.12		170	4	21	soybean grain	0.037 0.027 m 0.032	AMR 4917-98
USA (IA), 1998 (Roundup Ready)	SC 3S+1R	0.12		130	4	21	soybean grain	0.010 0.008 m 0.009	AMR 4917-98
USA (IL), 1998 (DeKalb CX 205)	SC 3S+1R	0.12		150	4	23	soybean grain	0.011 0.009 m 0.010	AMR 4917-98
USA (IL), 1998 (Pioneer 9363)	SC 3S+1R	0.12		190	4	21	soybean grain	0.058 0.020 m 0.039	AMR 4917-98

SOYBEANS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer 2/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (IN), 1998 (RRX 8386)	SC 3S+1R	0.12		190	4	20	soybean grain	0.017 0.023 m 0.020	AMR 4917-98
USA (MD), 1998 (Asgrow A3834)	SC 3S+1R	0.12		200	4	0 7 14 21 28 21	soybean grain grain dust	0.052 0.068 0.015 0.017 0.013 0.015 0.016 0.012 m 0.014 0.009 0.008 2.8	AMR 4917-98 1/
USA (MI), 1998 (Terra)	SC 3S+1R	0.12		220	4	21	soybean grain	0.17 0.16 m 0.17	AMR 4917-98
USA (MN), 1998 (Roundup-Ready 8386)	SC 3S+1R	0.12		150	4	21	soybean grain	0.01 0.009 m 0.010	AMR 4917-98
USA (MN), 1998 (Roundup-Ready)	SC 3S+1R	0.12		150	4	0 7 14 21 28	soybean grain	0.096 0.098 0.054 0.058 0.061 0.056 0.013 0.010 m 0.012 0.011 0.012	AMR 4917-98
USA (MO), 1998 (Pioneer)	SC 3S+1R	0.12		200	4	20	soybean grain	0.008 0.008 m 0.008	AMR 4917-98
USA (MS), 1998 (DLP 3478)	SC 3S+1R	0.12		90	4	0 7 14 21 28	soybean grain	0.12 0.088 0.023 0.014 0.019 0.011 0.027 0.032 m 0.030 0.026 0.031	AMR 4917-98
USA (MS), 1998 (Roundup-Ready)	SC 3S+1R	0.12		95	4	21	soybean grain	0.34 0.24 m 0.30	AMR 4917-98
USA (NC), 1998 (AG 5601)	SC 3S+1R	0.12		190	4	22	soybean grain	0.032 0.444 m 0.238	AMR 4917-98
USA (ND), 1998 (Roundup-Ready)	SC 3S+1R	0.12		130	4	21	soybean grain	0.010 0.011 m 0.011	AMR 4917-98
USA (NE), 1998 (Pioneer 92B52)	SC 3S+1R	0.12		190	4	21	soybean grain	0.032 0.032 m 0.032	AMR 4917-98
USA (OH), 1998 (Roundup Ready)	SC 3S+1R	0.12		220	4	21	soybean grain	0.26 0.23 m 0.25	AMR 4917-98
USA (OH), 1998 (Terra)	SC 3S+1R	0.12		220	4	21	soybean grain	0.59 0.30 m 0.45	AMR 4917-98
USA (SD), 1998 (Roundup-Ready)	SC 3S+1R	0.12		130	4	21	soybean grain	0.010 0.009 m 0.010	AMR 4917-98
USA (WI), 1998 (AG 2501)	SC 3S+1R	0.12		170	4	21	soybean grain	0.024 0.023 m 0.024	AMR 4917-98

1/ Ref AMR 4917-98. Moisture levels were measured on 15 soybean samples from 9 trials. % dry matter (DM) = 85%, range 79-90%.

2/ m: mean.

Table 37. Indoxacarb residues in potatoes resulting from supervised trials in USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer. Almost all of the residues in the tubers were below the LOQ of the analytical method, 0.01 mg/kg. Many of the residue levels were also less than the limit of detection, 0.003 mg/kg. The values quoted below the LOQ are not validated and should be interpreted as such.

POTATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (ME), 1998 (FL-1725)	WG 3S+1R	0.075		195	4	7	tuber	0.003 0.003	AMR 4902-98
USA (ME), 1998 (FL-1725)	WG 3S+1R	0.15		195	4	7	tuber	0.005 0.004	AMR 4902-98
USA (PA), 1998 (Maine)	WG 3S+1R	0.075		220	4	7	tuber	0.003 0.003	AMR 4902-98
USA (PA), 1998 (Maine)	WG 3S+1R	0.15		220	4	7	tuber	0.004 0.006	AMR 4902-98
USA (MD), 1998 (Superior B)	WG 3S+1R	0.075		350	4	0 3 7 14 21	tuber	< 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2) 0.003 < 0.003	AMR 4902-98
USA (MD), 1998 (Superior B)	WG 3S+1R	0.15		350	4	0 3 7 14 21	tuber	< 0.003 (2) < 0.003 0.003 < 0.003 (2) < 0.003 (2) < 0.003 (2)	AMR 4902-98
USA (FL), 1998 (Red Pontiac)	WG 3S+1R	0.075		360	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (FL), 1998 (Red Pontiac)	WG 3S+1R	0.15		360	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (MI), 1998 (Onaway)	WG 3S+1R	0.075		210	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (MI), 1998 (Onaway)	WG 3S+1R	0.15		210	4	7	tuber	< 0.003 0.005	AMR 4902-98
USA (MN), 1998 (Red Pontiac)	WG 3S+1R	0.075		150	4	0 3 7 14 21	tuber	0.005 < 0.003 < 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2)	AMR 4902-98
USA (MN), 1998 (Red Pontiac)	WG 3S+1R	0.15		150	4	0 3 7 14 21	tuber	0.004 0.011 < 0.003 0.004 < 0.003 (2) < 0.003 (2) < 0.003 0.003	AMR 4902-98

POTATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (WI), 1998 (Superior)	WG 3S+1R	0.075		170	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (WI), 1998 (Superior)	WG 3S+1R	0.15		170	4	7	tuber	0.004 0.007	AMR 4902-98
USA (ND), 1998 (Norgold)	WG 3S+1R	0.075		135	4	7	tuber	0.006 < 0.003	AMR 4902-98
USA (ND), 1998 (Norgold)	WG 3S+1R	0.15		135	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (CO), 1998 (Norkotah)	WG 3S+1R	0.075		190	4	7	tuber	< 0.003 0.003	AMR 4902-98
USA (CO), 1998 (Norkotah)	WG 3S+1R	0.15		190	4	7	tuber	< 0.003 0.003	AMR 4902-98
USA (CA), 1998 (Atlantic)	WG 3S+1R	0.075		190	4	7	tuber	< 0.003 0.003	AMR 4902-98
USA (CA), 1998 (Atlantic)	WG 3S+1R	0.15		190	4	7	tuber	0.011 0.006	AMR 4902-98
USA (WA), 1998 (Russet Burbank)	WG 3S+1R	0.075		200	4	0 3 7 14 21	tuber	< 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2)	AMR 4902-98
USA (WA), 1998 (Russet Burbank)	WG 3S+1R	0.15		200	4	0 3 7 14 21	tuber	< 0.003 (2) < 0.003 0.003 < 0.003 (2) 0.003 < 0.003 < 0.003 (2)	AMR 4902-98
USA (ID), 1998 (Russet Burbank)	WG 3S+1R	0.075		150	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (ID), 1998 (Russet Burbank)	WG 3S+1R	0.15		150	4	7	tuber	< 0.003 0.003	AMR 4902-98
USA (ID), 1998 (Ranger)	WG 3S+1R	0.075		190	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (ID), 1998 (Ranger)	WG 3S+1R	0.15		190	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (WA), 1998 (Russet Burbank)	WG 3S+1R	0.075		190	4	7	tuber	< 0.003 0.004	AMR 4902-98
USA (WA), 1998 (Russet Burbank)	WG 3S+1R	0.15		190	4	7	tuber	0.003 0.003	AMR 4902-98
USA (OR), 1998 (Russet Burbank)	WG 3S+1R	0.075		120	4	8	tuber	< 0.003 (2)	AMR 4902-98

POTATOES country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (OR), 1998 (Russet Burbank)	WG 3S+1R	0.15		120	4	8	tuber	< 0.003 (2)	AMR 4902-98
USA (ID), 1998 (Russet Burbank)	WG 3S+1R	0.075		190	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (ID), 1998 (Russet Burbank)	WG 3S+1R	0.15		190	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (ND), 1999 (Norgold)	WG 3S+1R	0.075		140	4	7	tuber	< 0.003 (2)	AMR 4902-98
USA (ND), 1999 (Norgold)	WG 3S+1R	0.15		140	4	7	tuber	< 0.003 (2)	AMR 4902-98

Table 38. Indoxacarb residues in peanuts resulting from supervised trials in USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer. All of the residues in the peanut kernels were below the LOQ of the analytical method, 0.01 mg/kg and also the limit of detection, 0.003 mg/kg. Values quoted below the LOQ are not validated and should be interpreted as such.

PEANUTS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (LL/ha)	no.				
USA (NC), 1997 (NC 9)	SC 3S+1R	0.12		140	4	1 3 7 14 21	kernels	< 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (NC), 1997 (NC 9)	SC 3S+1R	0.12		140	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (NC), 1997 (NC-V-11)	SC 3S+1R	0.12		140	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (VA), 1997 (NC 7)	SC 3S+1R	0.12		210	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (SC), 1997 (Birdsong 108)	SC 3S+1R	0.12		190	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (GA), 1997 (Georgia Runner)	SC 3S+1R	0.12		170	4	14	kernels	< 0.003 (2)	AMR 4349-97 1/
USA (GA), 1997 (GK7)	SC 3S+1R	0.12		100	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (VA), 1997 (NC-V-11)	SC 3S+1R	0.12		140	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/

PEANUTS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (LL/ha)	no.				
USA (TX), 1997 (Spanish)	SC 3S+1R	0.12		220	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (OK), 1997 (Spanco)	SC 3S+1R	0.12		180	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (TX), 1997 (Valencia)	SC 3S+1R	0.12		180	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (FL), 1999 (Georgia Screen)	SC 3S+1R	0.12		230	4	14 21	kernels	< 0.003 (2) < 0.003 (2)	AMR 4349-97 1/
USA (GA), 1997 (GK-7)	SC 3S+1R	0.12		100	4	14	kernels	< 0.003	AMR 4551-97

1/ Peanuts, study AMR 4349-97. The PHI was the interval between treatment and digging. Peanuts were dug and allowed to dry in the field for 3 to 13 days before being sampled.

Table 39. Indoxacarb residues in cotton seed resulting from supervised trials in India and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer. Seed cotton is defined as cotton exactly as picked, undelinted seed is cotton that prior to analysis was ginned but not processed to remove remaining lint, e.g., acid delinting.

COTTON SEED country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (NC), 1995 (DPL-50) Cotton	SE racemic 2/	0.075		94	4	14 21 28	undelinted cotton seed	0.26 0.17 0.25 0.16 0.25 0.12	AMR 3284-95
USA (NC), 1995 (DPL-50) Cotton	SE racemic 2/	0.15		94	4	14 21 28	undelinted cotton seed	0.28 0.30 0.42 0.25 0.27 0.29	AMR 3284-95
USA (MS), 1995 (DPL-51) Cotton	SE racemic 2/	0.075		56	4	14 19 28	undelinted cotton seed	1.3 0.77 0.140.25 0.27 0.18	AMR 3284-95
USA (MS), 1995 (DPL-51) Cotton	SE racemic 2/	0.15		56	4	14 19 28	undelinted cotton seed	1.3 0.92 0.61 0.47 0.51 0.42	AMR 3284-95
USA (AR), 1995 (DPL-51) Cotton	SE racemic 2/	0.075		120	4	14 21 26	undelinted cotton seed	0.051 0.057 0.063 0.071 0.082 0.16	AMR 3284-95
USA (AR), 1995 (DPL-51) Cotton	SE racemic 2/	0.15		120	4	14 21 26	undelinted cotton seed	0.13 0.17 0.15 0.42 0.25 0.58	AMR 3284-95

COTTON SEED country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (TX), 1995 (DPL-50) Cotton	SE racemic 2/	0.075		190	4	14 21 28	undelinted cotton seed	0.23 0.14 0.24 0.23 0.27 0.16	AMR 3284-95
USA (TX), 1995 (DPL-50) Cotton	SE racemic 2/	0.15		190	4	14 21 28	undelinted cotton seed	0.34 0.43 0.43 0.56 0.40 0.46	AMR 3284-95
USA (TX), 1995 (Paymaster 145) Cotton	SE racemic 2/	0.075		140	4	0 7 14 21 28	undelinted cotton seed	0.93 0.72 1.1 0.98 0.64 0.90 1.2 0.97 1.5 0.81	AMR 3284-95
USA (TX), 1995 (Paymaster 145) Cotton	SE racemic 2/	0.15		140	4	0 7 14 21 28	undelinted cotton seed	2.8 2.9 1.3 1.1 1.7 1.9 1.4 2.0 2.1 1.4 c 0.018	AMR 3284-95
USA (OK), 1995 (Paymaster HS 126) Cotton	SE racemic 2/	0.075		110	4	14 20 28	undelinted cotton seed	0.55 0.50 0.18 0.30 0.15 0.16	AMR 3284-95
USA (OK), 1995 (Paymaster HS 126) Cotton	SE racemic 2/	0.15		110	4	14 20 28 14	undelinted cotton seed	1.6 0.87 0.27 0.38 c 0.012 0.24 0.29 c 0.016 c 2.2, < 0.01 (7)	AMR 3284-95
USA (AZ), 1995 (DPL-5415) Cotton	SE racemic 2/	0.075		140	4	14 21 28	undelinted cotton seed	0.40 0.35 0.43 0.31 0.29 0.34	AMR 3284-95
USA (AZ), 1995 (DPL-5415) Cotton	SE racemic 2/	0.15		140	4	14 21 28	undelinted cotton seed	0.82 1.2 0.67 0.56 0.46 0.46 c 0.010	AMR 3284-95
USA (CA), 1995 (Acala Maxa) Cotton	SE racemic 2/	0.075		180	4	0 7 14 20 28	undelinted cotton seed	0.41 0.39 0.35 0.34 0.30 0.28 0.22 0.15 0.62 0.44	AMR 3284-95
USA (CA), 1995 (Acala Maxa) Cotton	SE racemic 2/	0.15		180	4	0 7 14 20 28	undelinted cotton seed	1.0 1.4 0.92 0.90 1.6 1.5 c 0.013 1.3 2.0 c 0.011 1.2 1.2 c 0.010	AMR 3284-95
USA (GA), 1996 (DPL 5415) Cotton	SC 3S+1R	0.075			4	13 21 28	undelinted cotton seed	0.27 0.45 0.16 0.24 0.29 0.25	AMR 3949-96
USA (GA), 1996 (DPL 5415) Cotton	SC 3S+1R	0.15			4	13 21 28	undelinted cotton seed	0.26 0.22 0.26 0.25 m 0.26 0.19 0.20	AMR 3949-96

COTTON SEED country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (MS), 1996 (DPL 51) Cotton	SC 3S+1R	0.075			4	13 20 27	undelinted cotton seed	0.10 0.16 0.080 0.054 0.10 0.053	AMR 3949-96
USA (MS), 1996 (DPL 51) Cotton	SC 3S+1R	0.15			4	13 20 27	undelinted cotton seed	0.27 0.47 m <u>0.37</u> 0.32 0.085 0.12 0.15	AMR 3949-96
USA (MS), 1996 (DPL 51) Cotton	SE racemic	0.075			4	13 20 27	undelinted cotton seed	0.14 0.15 0.075 0.25 0.51 0.053	AMR 3949-96
USA (MS), 1996 (DPL 51) Cotton	SE racemic	0.15			4	13 20 27	undelinted cotton seed	0.38 0.30 0.57 0.26 0.23 0.085	AMR 3949-96
USA (TX), 1996 (Deltapine 50) Cotton	SC 3S+1R	0.075			4	14 21 28	undelinted cotton seed	0.091 0.15 0.19 0.091 0.063 0.060	AMR 3949-96
USA (TX), 1996 (Deltapine 50) Cotton	SC 3S+1R	0.15			4	14 21 28	undelinted cotton seed	0.31 0.22 0.26 0.28 m <u>0.27</u> 0.12 0.24	AMR 3949-96
USA (TX), 1996 (Deltapine 50) Cotton	SE racemic	0.075			4	14 21 28	undelinted cotton seed	0.22 0.30 0.10 0.15 0.086 0.063	AMR 3949-96
USA (TX), 1996 (Deltapine 50) Cotton	SE racemic	0.15			4	14 21 28	undelinted cotton seed	0.60 0.59 0.18 0.41 0.10 0.41	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.075			4	0 7 14 21 28	undelinted cotton seed	0.32 0.43 0.19 0.23 0.21 0.18 0.14 0.094 0.16 0.10	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.15			4	0 7 14 21 28	undelinted cotton seed	0.61 0.62 0.46 0.53 c 0.011 0.36 0.35 m <u>0.36</u> 0.33 0.33 0.41 0.30	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SE racemic	0.075			4	14 21 28	undelinted cotton seed	0.26 0.24 0.45 0.36 0.29 0.52	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SE racemic	0.15			4	14 21 28	undelinted cotton seed	0.51 1.0 0.84 0.96 0.84 1.1	AMR 3949-96
USA (OK), 1996 (Paymaster HS200) Cotton	SC 3S+1R	0.075			4	14 21 28	undelinted cotton seed	0.018 0.017 0.036 0.030 0.030 0.039	AMR 3949-96

COTTON SEED country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (OK), 1996 (Paymaster HS200) Cotton	SC 3S+1R	0.15			4	14 21 28	undelinted cotton seed	0.061 0.033 0.042 0.060 0.073 0.060 m 0.067	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.075			4	14 21 28	undelinted cotton seed	0.39 0.44 0.16 0.095 0.15 0.18	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.15			4	14 21 28	undelinted cotton seed	0.91 0.92 m 0.92 0.42 0.35 0.31 0.25	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SC 3S+1R	0.075			4	17 21 28	undelinted cotton seed	0.13 0.21 < 0.01 0.10 0.019 0.020	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SC 3S+1R	0.15			4	17 21 28	undelinted cotton seed	0.58 0.72 m 0.65 0.42 0.34 0.11 0.12	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SE racemic	0.075			4	17 21 28	undelinted cotton seed	0.17 0.16 0.071 0.11 0.027 0.027	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SE racemic	0.15			4	17 21 28	undelinted cotton seed	0.54 0.62 0.33 0.57 0.35 0.79	AMR 3949-96
India, 1996 (RCH-2)	SC 3S+1R	0.1		400-650	7	21	cotton seed	< 0.01 (3)	R-006/1998
India, 1996 (RCH-2)	SC 3S+1R	0.2		400-650	7	21	cotton seed	< 0.01 (3)	R-006/1998
India, 1997 (RCH-2)	SC 3S+1R	0.1		400-650	4	15	cotton seed	< 0.01 (3)	R-009/1998
India, 1997 (RCH-2)	SC 3S+1R	0.2		400-650	4	15	cotton seed	< 0.01 (3)	R-009/1998
India, 1997 (RCH-2)	SC 3S+1R	0.1		400-650	4	13	cotton seed	< 0.01 (3)	R-010/1998
India, 1997 (RCH-2)	SC 3S+1R	0.2		400-650	4	13	cotton seed	< 0.01 (3)	R-010/1998

1/ c: sample from control plot. m: mean.
2/ Report AMR 3284-95, page 12. Experimental SE (suspension-emulsion) formulation.

Table 40. Indoxacarb residues in legume animal feeds resulting from supervised trials in Australia and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

LEGUME ANIMAL FEEDS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
CHICKPEA FODDER									
Australia (NSW), 2000 (Amethyst) Chickpea	SC 3S+1R	0.045		125	1	1 7 13 21 28	plant plant plant plant trash	3.8 2.4 0.86 0.53 1.2	0P04946 AUJ-99-019
Australia (NSW), 2000 (Amethyst) Chickpea	SC 3S+1R	0.090		125	1	1 7 13 21 28	plant plant plant plant trash	7.3 5.2 1.2 1.0 2.4	0P04946 AUJ-99-019
Australia (Qld), 2000 (Barwon) Chickpea	SC 3S+1R	0.045		125	1	1 7 13 21 29	plant plant plant plant trash	1.3 1.7 0.81 0.47 0.78	0P04947 AUJ-99-018
Australia (Qld), 2000 (Barwon) Chickpea	SC 3S+1R	0.090		125	1	1 7 13 21 29	plant plant plant plant trash	2.0 3.7 2.2 1.5 2.5	0P04947 AUJ-99-018
Australia (NSW), 1999 (Amethyst) Chickpea	SC 3S+1R	0.045		90	1	1 7 13 21 28	plant plant plant plant trash	4.4 (16 on dry wt) 2.0 (6.5 on dry wt) 1.4 (3.5 on dry wt) 0.70 (1.0 on dry wt) 1.1	99/5805 AUJ-99-014
Australia (NSW), 1999 (Amethyst) Chickpea	SC 3S+1R	0.090		90	1	1 7 13 21 28	plant plant plant plant trash	7.1 (26 on dry wt) 4.0 (12 on dry wt) 2.8 (7.1 on dry wt) 1.3 (1.9 on dry wt) 1.9	99/5805 AUJ-99-014
Australia (Qld), 1999 (Amethyst) Chickpea	SC 3S+1R	0.045		100	1	1 7 13 21 28 1	plant plant plant plant trash plant	5.4 (19 on dry wt) 2.7 (7.8 on dry wt) 2.0 (6.0 on dry wt) 0.78 (1.3 on dry wt) 0.78 c 0.02 (0.07 on dry wt)	99/5806 AUJ-99-015
Australia (Qld), 1999 (Amethyst) Chickpea	SC 3S+1R	0.090		100	1	1 7 13 21 28 1	plant plant plant plant trash plant	7.3 (26 on dry wt) 4.4 (14 on dry wt) 2.7 (7.4 on dry wt) 1.8 (3.5 on dry wt) 0.89 c 0.02 (0.07 on dry wt)	99/5806 AUJ-99-015
MUNG BEAN FODDER									

LEGUME ANIMAL FEEDS country, year (variety)	Application					PHI	Commodity	Residues, mg/kg 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		indoxacarb + R enantiomer	
Australia (Qld), 2000 (Emerald) Mungbeans	SC 3S+1R	0.060		98	1	0 7 14 21 28	plant plant plant plant trash	6.3 1.2 0.79 0.58 1.3	1P00833 0449
Australia (Qld), 2000 (Emerald) Mungbeans	SC 3S+1R	0.090		98	1	0 7 14 21 28	plant plant plant plant trash	9.3 1.4 1.2 0.86 1.6	1P00833 0449
Australia (Qld), 2000 (Green Diamond) Mungbeans	SC 3S+1R	0.060		100	1	0 7 13 20 28	plant plant plant plant trash	3.5 1.4 2.1 1.4 5.6	0P04943 AUJ-00-010
Australia (Qld), 2000 (Green Diamond) Mungbeans	SC 3S+1R	0.090		100	1	0 7 13 20 28	plant plant plant plant trash	4.3 2.1 2.7 2.8 4.9	0P04943 AUJ-00-010
Australia (NSW), 2000 (Emerald) Mungbeans	SC 3S+1R	0.060		80	1	0 28	plant trash	3.2 c 0.14 1.7 c < 0.02	0P04942 AUJ-00-022
Australia (NSW), 2000 (Emerald) Mungbeans	SC 3S+1R	0.090		80	1	0 28	plant trash	5.7 c 0.14 2.3 c < 0.02	0P04942 AUJ-00-022
PEANUT HAY									
USA (NC), 1997 (NC 9)	SC 3S+1R	0.12		140	4	1 3 7 14 21	peanut hay 2/	12 8.4 13 14 9.5 9.6 11 11 m 11 8.5 6.5	AMR 4349-97
USA (NC), 1997 (NC 9)	SC 3S+1R	0.12		140	4	14 21	peanut hay	8.2 9.5 m 8.9 7.5 8.2	AMR 4349-97
USA (NC), 1997 (NC-V-11)	SC 3S+1R	0.12		140	4	14 21	peanut hay	16 14 m 15 15 15 3/	AMR 4349-97
USA (VA), 1997 (NC 7)	SC 3S+1R	0.12		210	4	14 21	peanut hay	32 33 m 33 30 23	AMR 4349-97
USA (SC), 1997 (Birdsong 108)	SC 3S+1R	0.12		190	4	14 21	peanut hay	18 18 m 18 13 13	AMR 4349-97
USA (GA), 1997 (Georgia Runner)	SC 3S+1R	0.12		170	4	14	peanut hay	9.3 10 m 9.7	AMR 4349-97

LEGUME ANIMAL FEEDS country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (GA), 1997 (GK7)	SC 3S+1R	0.12		100	4	14 21	peanut hay	10 12 m 11 9.5 7.0 c 0.016	AMR 4349-97
USA (VA), 1997 (NC-V-11)	SC 3S+1R	0.12		140	4	14 21	peanut hay	25 17 m 21 19 17	AMR 4349-97
USA (TX), 1997 (Spanish)	SC 3S+1R	0.12		220	4	14 21	peanut hay	2.7 1.5 m 2.1 c 0.015 2.1 1.2	AMR 4349-97
USA (OK), 1997 (Spanco)	SC 3S+1R	0.12		180	4	14 21	peanut hay	14 12 m 13 4.5 4.1	AMR 4349-97
USA (TX), 1997 (Valencia)	SC 3S+1R	0.12		180	4	14 21	peanut hay	2.7 2.3 m 2.5 2.8 2.2	AMR 4349-97
USA (FL), 1999 (Georgia Screen)	SC 3S+1R	0.12		230	4	14 21	peanut hay	11 7.0 13 11 m 12	AMR 4349-97
SOYBEAN FODDER									
Australia (Qld), 2000 (Leichardt) Soybean	SC 3S+1R	0.060		120	1	0 7 14 20 27	plant plant plant plant trash	4.6 3.3 5.0 2.1 0.21 0.19 m 0.20	1P00834 0448
Australia (Qld), 2000 (Leichardt) Soybean	SC 3S+1R	0.12		120	1	0 7 14 20 27	plant plant plant plant trash	10.1 7.6 8.1 7.9 0.39 0.26	1P00834 0448
Australia (Qld), 2000 (Koana) Soybean	SC 3S+1R	0.060		100	1	0 7 15 22 29	plant plant plant plant trash	1.8 1.3 0.45 < 0.02 0.11	0P04941 AUJ-00-014
Australia (Qld), 2000 (Koana) Soybean	SC 3S+1R	0.090		100	1	0 7 15 22 29	plant plant plant plant trash	3.8 0.43 0.40 0.23 0.14	0P04941 AUJ-00-014
Australia (NSW), 2000 (Dragon) Soybean	SC 3S+1R	0.060		80	1	0 28	plant trash	4.4 c 0.54 0.07	0P04940 AUJ-00-023
Australia (NSW), 2000 (Dragon) Soybean	SC 3S+1R	0.090		80	1	0 28	plant trash	6.3 c 0.54 0.08	0P04940 AUJ-00-023

1/ c: sample from control plot. m: mean.
2/ Peanut hay in study AMR 4349-97. Moisture levels were measured on 13 samples of peanut hay – range = 19-36%, mean = 28%, SD = 6% units.
3/ Peanut trial, study AMR 4349-97, hay samples. A sample from the control plot and a sample from the treated plot had apparently been mislabelled in the field.

4/ In the Australian trials, 'trash' refers to the plant parts other than the beans, such as leaves and stems that remain after harvesting. It may be used as an animal feed.

Table 41. Indoxacarb residues in alfalfa resulting from supervised trials in USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

ALFALFA country, year (variety)	Application				PHI days	Commodity	Moisture	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	water (L/ha)	no.					
USA (PA), 1997 (Apollo)	SC 3S+1R	0.12	190	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	76 74 78 78 74 74 70 70 80 80 78 78 82 82 80 78	5.3 4.5 3.4 3.2 m 3.3 7.2 5.5 6.2 6.2 m 6.2 3.8 4.2 2.7 3.6 m 3.2 4.3 4.9 3.4 4.1 m 3.8	AMR 4350-97
USA (MD), 1997 (Savanac, AR)	SC 3S+1R	0.12	220	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	80 78 74 76 76 78 72 74 74 76 72 72 80 80 78 76	4.9 4.1 4.9 4.6 m 4.8 6.4 4.9 4.0 4.8 m 4.4 5.6 5.8 8.4 6.6 m 7.5 7.1 6.3 5.1 6.1 m 5.6	AMR 4350-97
USA (MN), 1997 (Trident)	SC 3S+1R	0.12	190	1 1 1 1 1 2 2 2 2 2 3 3 3 3 3	0 3 7 10 14 0 3 7 10 14 0 3 7 10 14	forage	78 78 74 76 68 68 64 70 70 70 72 76 72 66 76 76 68 72 72 72 76 74 78 76 74 76 72 76 74 74	7.4 5.4 6.6 5.5 2.1 4.5 4.8 3.0 m 3.9 1.6 2.4 7.3 6.7 2.6 3.4 1.0 2.4 2.0 1.5 m 1.8 1.7 1.7 9.5 7.9 9.6 8.8 6.5 5.5 m 6.0 5.5 6.1 2.6 2.2	AMR 4350-97
USA (OH), 1997 (Paramount)	SC 3S+1R	0.12	200	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	80 80 84 84 72 72 74 72 82 82 80 80 74 74 70 70	1.7 1.9 1.5 1.4 m 1.5 3.2 2.8 3.5 2.2 m 2.9 2.5 2.1 2.3 2.6 m 2.5 7.1 4.7 8.4 5.6 m 7.0	AMR 4350-97
USA (WI), 1997 (Renk Quantum)	SC 3S+1R	0.12	170	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	90 84 84 82 84 84 80 80 76 76 78 78 84 84 82 84	3.7 4.3 2.0 2.1 m 2.1 4.8 2.8 2.7 3.4 m 3.1 4.8 6.0 3.9 4.5 m 4.2 7.3 4.9 4.4 4.5 m 4.5	AMR 4350-97

ALFALFA country, year (variety)	Application				PHI days	Commodity	Moisture	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	water (L/ha)	no.					
USA (SD), 1997 (Dekalb 120)	SC 3S+1R	0.12	94	1 1 2 2 3 3	3 7 3 7 3 7	forage	70 70 66 66 70 70 70 70 74 76 72 74	5.2 3.8 5.0 5.6 m 5.3 6.7 7.6 7.5 5.6 m 6.6 5.4 15 5.3 5.3 m 5.3	AMR 4350-97
USA (NE), 1997 (Alfa Leaf)	SC 3S+1R	0.12	190	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	78 76.5 78 78 78 78 80 78 78 80 76 76 82 82 82 82	7.8 7.3 5.5 5.9 m 5.7 3.1 3.0 2.3 2.1 m 2.2 2.9 3.7 4.1 3.7 m 3.9 7.0 7.3 3.1 3.1 m 3.1	AMR 4350-97
USA (KS), 1997 (Garst 630)	SC 3S+1R	0.12	190	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	74 76 74 74 76 78 80 82 74 72 74 74 84 84 82 82	5.1 4.7 3.5 3.3 m 3.4 7.9 8.2 3.1 2.6 m 2.9 6.6 5.7 5.0 3.7 m 4.4 3.9 2.7 2.1 1.6 m 1.9	AMR 4350-97
USA (SD), 1997 (Ciba 2888)	SC 3S+1R	0.12	190	1 1 2 2 3 3	3 7 3 7 3 7	forage	74 74 70 70 70 72 72 72 76 74 64 66	4.5 5.0 2.5 2.3 m 2.4 0.97 1.2 2.7 2.7 m 2.7 6.4 7.7 10 9.3 m 9.7	AMR 4350-97
USA (MT), 1997 (NK 919)	SC 3S+1R	0.12	190	1 1 2 2	3 7 3 7	forage	84 82 82 80 84 84 78 78	2.7 3.2 2.2 2.7 m 2.5 2.1 2.1 2.8 3.4 m 3.1	AMR 4350-97
USA (AZ), 1997 (CUF 101)	SC 3S+1R	0.12	140	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 7	forage	84 80 82 82 82 82 84 84 76 80 80 78 78 78 80 80	4.3 3.4 3.8 3.9 m 3.9 2.3 2.6 1.7 1.4 m 1.6 4.2 3.0 3.0 3.5 m 3.3 2.4 2.5 1.3 0.58 m 0.94	AMR 4350-97
USA (ID), 1997 (Pioneer 5364)	SC 3S+1R	0.12	160	1 1 2 2 3 3 4 4	3 7 3 7 3 7 3 8	forage	36 80 90 84 74 76 78 78 76 74 76 78 82 82 80 82	2.6 2.3 3.1 1.6 m 2.4 4.7 5.1 3.6 4.4 m 4.0 6.1 6.5 5.2 4.3 m 3.8 5.9 4.3 3.2 3.5 m 3.4	AMR 4350-97

ALFALFA country, year (variety)	Application				PHI days	Commodity	Moisture	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	water (L/ha)	no.					
USA (PA), 1997 (Apollo)	SC 3S+1R	0.12	190	1	3	hay	27 22	19 14	AMR 4350-97
				1	7		38 38	9.3 11 m 10	
				2	3		34 33	25 24	
				2	7		22 22	14 16 m 15	
				3	3		28 28	24 24	
				3	7		32 36	10 10 m 10	
				4	3		46 48	27 26	
				4	7		38 38	15 17 m 16	
USA (MD), 1997 (Savanac, AR)	SC 3S+1R	0.12	220	1	3	hay	20 22	25 25	AMR 4350-97
				1	7		26 26	15 15 m 15	
				2	3		16 16	22 24	
				2	7		22 20	15 17 m 16	
				3	3		28 28	23 23	
				3	7		28 22	21 28 m 25	
				4	3		20 16	34 38	
				4	7		30 32	26 19 m 23	
USA (MN), 1997 (Trident)	SC 3S+1R	0.12	190	1	0	hay	44 40	9.1 16	AMR 4350-97
				1	3		46 44	17 13	
				1	7		36 34	6.8 5.7 m 6.3	
				1	10		61 63	5.4 5.4	
				1	14		38 34	3.9 4.7	
				2	0		26 28	6.3 5.8	
				2	3		26 36	7.5 5.7	
				2	7		17 16	8.8 3.4 m 6.1	
				2	10		34 30	2.2 4.2	
				2	14		18 16	3.3 4.3	
				3	0		36 26	7.2 23	
				3	3		44 46	7.5 6.1 c 1.1	
				3	7		30 41	16 16 m 16	
				3	10		38 46	16 15	
				3	14		63 60	4.5 5.8	
USA (OH), 1997 (Paramount)	SC 3S+1R	0.12	200	1	3	hay	64 52	0.044 0.003	AMR 4350-97
				1	7		70 66	2.2 2.6 m 2.4	
				2	3		20 26	12 8.8	
				2	7		50 42	9.1 4.9 m 7.0	
				3	3		34 44	18 14	
				3	7		50 46	7.0 7.9 m 7.5	
				4	3		30 26	27 16	
				4	7		34 28	13 11 m 12	
USA (WI), 1997 (Renk Quantum)	SC 3S+1R	0.12	170	1	3	hay	60 54	9.0 9.8	AMR 4350-97
				1	7		58 54	9.2 7.2 m 8.2	
				2	3		52 48	14 16	
				2	7		16 16	20 22 m 21	
				3	3		12 14	26 26	
				3	7		20 20	20 20 m 20	
				4	3		30 28	42 36	
				4	7		40 40	23 29 m 26	
USA (SD), 1997 (Dekalb 120)	SC 3S+1R	0.12	94	1	3	hay	12 12	14 12	AMR 4350-97
				1	7		16 16	17 19 m 18	
				2	3		12 12	23 22	
				2	7		14 12	17 15 m 16	
				3	3		12 12	23 23	
				3	7		24 22	19 19 m 19	

ALFALFA country, year (variety)	Application Form	kg ai/ha	water (L/ha)	no.	PHI days	Commodity	Moisture	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
USA (NE),	SC	0.12	190	1	3	hay	38 37	22 27	AMR 4350-
1997 (Alfa	3S+1R			1	7		40 38	21 18 m 20	97
Leaf)				2	3		34 36	14 12	
				2	7		42 40	6.9 6.7 m 6.8	
				3	3		36 36	16 17	
				3	7		26 26	19 16 m 18	
				4	3		40 42	45 35	
				4	7		44 44	16 13 m 15	
USA (KS),	SC	0.12	190	1	3	hay	42 54	13 15	AMR 4350-
1997 (Garst	3S+1R			1	7		46 46	8.2 7.2 m 7.7	97
630)				2	3		42 32	24 25	
				2	7		38 28	10 12 m 11	
				3	3		26 26	22 24	
				3	7		26 30	10 10 m 10	
				4	3		26 26	21 23	
				4	7		44 44	7.2 6.1 6.7	
USA (SD),	SC	0.12	190	1	3	hay	44 36	10 13	AMR 4350-
1997 (Ciba	3S+1R			1	7		40 38	8.0 8.3 m 8.2	97
2888)				2	3		26 20	6.5 3.8	
				2	7		14 14	8.4 7.9 m 8.2	
				3	3		82 42	11 8.3 c 11	
				3	7		20 24	24 23 m 24	
USA (MT),	SC	0.12	190	1	3	hay	44 46	17 12	AMR 4350-
1997 (NK	3S+1R			1	7		54 48	5.4 6.2 m 5.8	97
919)				2	3		46 48	13 11	
				2	7		30 26	8.9 9.4 m 9.2	
USA (AZ),	SC	0.12	140	1	3	hay	32 38	3.6 14	AMR 4350-
1997 (CUF	3S+1R			1	7		44 32	10 8.3 m 9.2	97
101)				2	3		12 10	14 10	
				2	7		40 36	9.0 9.1 m 9.1	
				3	3		28 28	12 8.8	
				3	7		26 22	7.1 10 m 8.6	
				4	3		14 12	8.4 15	
				4	7		14 16	7.2 8.2 m 7.7	
USA (ID),	SC	0.12	160	1	3	hay	56 16	11 13	AMR 4350-
1997 (Pioneer	3S+1R			1	7		14 16	10 10 m 10	97
5364)				2	3		12 12	26 18	
				2	7		12 12	23 16 m 20	
				3	3		10 10	16 17	
				3	7		20 18	19 32 m 26	
				4	3		18 18	21 17	
				4	7		16 14	15 18 m 17	

1/ c: sample from control plot. m: mean.

Table 42. Indoxacarb residues in sweet corn forage and fodder (= maize forage and fodder) resulting from supervised trials in USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

SWEET CORN FORAGE and FODDER country, year (variety)	Application				PHI	Commodity	Residues, mg/kg 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		indoxacarb + R enantiomer	
USA (NY), 1995 (Crusader)	WG racemic	0.075		230	4	3 14 21 35	forage 19% DM stover 23% DM	7.0 6.0 6.5 5.2 4.3 5.4 1.8 2.8	AMR 3291-95
USA (MD), 1995 (Seneca Horizon)	WG racemic	0.075		310	4	3 14 21 35	forage stover	7.0 7.0 7.1 4.2 6.2 6.7 9.6 5.2	AMR 3291-95
USA (FL), 1995 (Silver Queen)	WG racemic	0.075		470	4	0 1 3 7 14 21 33	forage 19% DM 20% DM stover	11 5.6 c 0.02 4.4 9.4 c 0.023 6.5 4.0 c 0.012 5.3 5.2 c 0.016 4.1 4.6 c 0.045 4.2 5.3 c 0.023 16 8.2 c 0.22 0.34	AMR 3291-95
USA (MN), 1995 (Earligold)	WG racemic	0.075		190	4	3 14 21 35	forage stover 34% DM	6.1 4.7 4.5 6.8 4.2 2.9 11 20	AMR 3291-95
USA (IL), 1995 (Illini Xtra-sweet)	WG racemic	0.075		220	4	3 14 21 38	forage 18% DM 19% DM stover	6.5 7.6 c 0.021 7.1 8.5 c 0.023 6.1 7.6 c 0.019 3.5 7.2	AMR 3291-95
USA (CA), 1995 (Silver Queen)	WG racemic	0.075		260	4	0 1 3 7 14 21 35	forage 20% DM 30% DM stover	9.9 7.9 4.7 1.7 6.2 1.8 c 0.011 9.6 7.1 2.1 11 12 7.4 0.86 1.4	AMR 3291-95
USA (OR), 1995 (Jubilee)	WG racemic	0.075		370	4	3 14 21 56	forage stover 34% DM	1.7 4.3 4.8 6.6 4.9 5.3 2.4 3.2	AMR 3291-95
USA (WA), 1995 (Golden Jubilee)	WG racemic	0.075		65	4	3 17 24 47	forage 22% DM 19% DM stover	13 7.0 c < 0.01 0.02 7.3 6.0 c 0.013 4.9 6.8 c0.017 6.6 3.1	AMR 3291-95
USA (MD), 1996 (Seneca Horizon)	WG 3S+1R	0.075		630	4	3 7 14 28	forage 18% DM stover 66% DM	2.9 2.7 2.4 4.4 7.1 7.6 6.6 13 m 9.8	AMR 3737-96

SWEET CORN FORAGE and FODDER country, year (variety)	Application					PHI	Commodity	Residues, mg/kg 1/	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	days		indoxacarb + R enantiomer	
USA (IL), 1996 (Fortune)	WG 3S+1R	0.075		220	4	0 1 3 7 14 48	forage 20% DM 19% DM 20% DM 24% DM stover	10 5.3 c 0.039 2.5 3.2 1.9 2.8 3.5 3.4 4.0 4.7 4.0 3.4 m 3.7	AMR 3737-96
USA (IL), 1996 (Fortune)	WG racemic	0.075		220	4	3 7 14 48	forage stover	4.8 6.4 c 0.038 4.7 7.2 c 0.037 3.8 5.2 8.6 6.3	AMR 3737-96
USA (MN), 1996 (Earlivee)	WG 3S+1R	0.075		190	4	3 7 14 49	forage 20% DM 29% DM stover 33% DM	1.1 0.095 0.63 1.0 0.93 0.96 1.5 1.7 m 1.6	AMR 3737-96
USA (MN), 1996 (Earlivee)	WG racemic	0.075		190	4	3 7 14 49	forage stover	5.2 10 4.6 4.0 3.8 7.4 3.6 5.8	AMR 3737-96
USA (IN), 1996 (Bodacious)	WG 3S+1R	0.075		220	4	3 7 14	forage 18% DM	2.2 3.1 2.0 1.9 1.4	AMR 3737-96
USA (IN), 1996 (Bodacious)	WG racemic	0.075		220	4	3 7 14	forage	5.6 6.0 5.0 c 0.016 8.3 5.6 c 0.015	AMR 3737-96
USA (WI), 1996 (Tuxedo)	WG 3S+1R	0.075		300	4	3 7 14 66	forage 15% DM 21 % DM stover 68% DM	4.5 4.4 4.2 3.7 4.6 3.5 5.2 5.4 m 5.3	AMR 3737-96
USA (WI), 1996 (Tuxedo)	WG racemic	0.075		300	4	3 7 14 66	forage stover	4.8 8.1 c.012 5.0 3.5 2.3 6.4 9.9 7.9	AMR 3737-96
USA (CA), 1996 (Silver Queen)	WG 3S+1R	0.075		250	4	3 7 14 35	forage 21% DM stover	1.0 1.7 0.73 0.65 0.59 0.66 2.2 1.6 m 1.9	AMR 3737-96

1/ c: sample from control plot. m: mean.

Table 43. Indoxacarb residues in cotton gin trash resulting from supervised trials in USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer. Cotton gin trash consists of plant residues (burrs, leaves, sticks and other plant parts) removed during stick extraction, the first procedure in the ginning process.

COTTON GIN TRASH country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (NC), 1995 (DPL-50) Cotton	SE racemic	0.075		94	4	14 21 28 14 21	gin trash 87% DM 90, 92% DM	19 c 0.079 16 c 0.085 17	AMR 3284-95
USA (MS), 1995 (DPL-51) Cotton	SE racemic	0.075		56	4	14 19 28	gin trash	54 24 c 0.13 22 c 0.083	AMR 3284-95
USA (TX), 1995 (Paymaster 145) Cotton	SE racemic	0.075		140	4	0 7 14 21 28 0	gin trash 78% DM	15 11 11 8.2 6.5	AMR 3284-95
USA (OK), 1995 (Paymaster HS 126) Cotton	SE racemic	0.075		110	4	14 20 28	gin trash	3.4 c 0.14 3.8 2.7	AMR 3284-95
USA (CA), 1995 (Acala Maxa) Cotton	SE racemic	0.075		140	4	0 7 13 14 20 28	gin trash 87% DM	22 c 0.29 0.43 c 1.2 c 0.50 40 35 c 2.4 20 c 1.2	AMR 3284-95
USA (GA), 1996 (DPL 5415) Cotton	SC 3S+1R	0.075		150	4	13	gin trash	8.2 9.1	AMR 3949-96
USA (GA), 1996 (DPL 5415) Cotton	SC 3S+1R	0.15		150	4	13	gin trash	8.4 8.4 m 8.4	AMR 3949-96
USA (MS), 1996 (DPL 51) Cotton	SC 3S+1R	0.075		94	4	13	gin trash	4.6 5.1, DM 90%	AMR 3949-96
USA (MS), 1996 (DPL 51) Cotton	SC 3S+1R	0.15		94	4	13	gin trash	12 9.1 m 11.6	AMR 3949-96
USA (TX), 1996 (Deltapine 50) Cotton	SC 3S+1R	0.075		110	4	14	gin trash	15, 12	AMR 3949-96

COTTON GIN TRASH country, year (variety)	Application					PHI days	Commodity	Residues, mg/kg 1/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA (TX), 1996 (Deltapine 50) Cotton	SC 3S+1R	0.15		110	4	14	gin trash	6.8 10 m 8.4	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.075		84	4	0 7 14 21 28	gin trash	6.9 2.4, DM90% 2.5 3.8, DM 96% 2.2 2.7	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.15		84	4	0 7 14 21 28	gin trash	9.8 4.1, DM 89% 7.5 4.9, DM 95% 3.4 7.2, DM 94% 0.43 4.2 7.1 6.0 m 6.6, DM 95%	AMR 3949-96
USA (OK), 1996 (Paymaster HS200) Cotton	SC 3S+1R	0.075		110	4	14	gin trash	3.8 1.5	AMR 3949-96
USA (OK), 1996 (Paymaster HS200) Cotton	SC 3S+1R	0.15		110	4	14	gin trash	2.9 4.2 m 3.6	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.075		75	4	14	gin trash	2.0 2.4	AMR 3949-96
USA (TX), 1996 (Paymaster 280) Cotton	SC 3S+1R	0.15		75	4	14	gin trash	8.8 4.6 m 6.7, DM 95%	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SC 3S+1R	0.075		200	4	17	gin trash	4.0 2.7, DM 77%	AMR 3949-96
USA (CA), 1996 (Maxim) Cotton	SC 3S+1R	0.15		200	4	17	gin trash	6.0 10 m 8.0	AMR 3949-96

1/ c: sample from control plot. m: mean.

FATE OF RESIDUES IN STORAGE AND PROCESSING

In processing

The Meeting received information on the fate of indoxacarb residues during aqueous hydrolysis under conditions of temperature and time representing pasteurisation and cooking. Information was also provided on the fate of indoxacarb residues during the food processing of apples, peaches, grapes, tomatoes, potatoes, soybeans, peanuts and cotton seed.

Ferraro and McUen (1996, AMR 2789-93) measured the hydrolysis rates of [^{14}C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring in buffer solutions at temperatures simulating cooking processes. The HPLC analytical method was not enantiomer-selective, so epimerisation, if it occurred, would not have been observed. Indoxacarb was generally stable to hydrolysis under pasteurisation conditions with 7–30% lost under the baking and boiling conditions (Table 44). The products of hydrolysis were minor and polar; no specific degradation product was identified.

Table 44. Effect of food processing conditions on the hydrolysis of [^{14}C]racemic indoxacarb (Ferraro and McUen, 1996, AMR 2789-93).

pH	Temp	Incubation time	% of initial indoxacarb remaining		Process represented
			indanone label	trifluoromethoxy-phenyl label	
4	90°C	20 min	85-94% (c 88%)	86-90% (c 92%)	pasteurisation
5	100°C	60 min	67-71% (c 100%)	87-89% (c 96%)	baking, brewing, boiling

c: control sample, taken after dilution and before heating.

Gagon and Klemens (1997, AMR 3952-96), in an apple processing trial in USA, treated Red Delicious apples with indoxacarb at 0.37 and 0.75 kg ai/ha (2.5× and 5×label rate) and harvested apples 7 days after treatment for processing to juice and pomace (Table 45). Apples were washed in recirculated chlorinated water followed by a spray of fresh water. Washed apples were cut by hand with knives and ground to pass through a 13 mm screen. The chopped apple was pressed by a screw press to produce wet pomace and unclarified apple juice. The unclarified juice was treated with pectinase at 38–48ºC and filtered through diatomaceous earth to produce clarified juice. The clarified juice was heated to 92ºC and poured into cans which were sealed. The process began with approximately 200 lb (90 kg) of apples and, after sampling and various discards, produced approximately 22 lb (10 kg) of wet pomace and 80 lb (36 kg) of clarified juice. Indoxacarb residues remained with the pomace fraction.

Klemens (1997, AMR 3293-95) treated apples with racemic indoxacarb and processed them into apple pomace and juice with the same procedure as described by Gagon and Klemens (1997, AMR 3952-96). The residue data are summarised in Table 45. The process began with approximately 160 lb (73 kg) of apples and, after sampling and various discards, produced approximately 20 lb (9 kg) of wet pomace and 56 lb (25 kg) of clarified juice. Indoxacarb residues remained with the pomace fraction.

Zietz (1997, AMR 3389-95) reported on the fate of indoxacarb residues in apples during household processing to juice, pomace and sauce (Table 45). Apples were washed with water and cut in half. A household juice extractor produced juice from one half of the apples. The pomace was the solid material remaining in the sieves of the centrifugal extractor. Pasteurized juice was prepared by heating a portion of juice to 75 ºC and allowing it to cool. Cut apples including peel were cooked in a pressure cooker to produce apple sauce. The indoxacarb residues from treated apples appeared mostly in the pomace with low concentrations in the juice.

Zietz and Simpson (1997, AMR 4016-96) described the household processing of indoxacarb-treated apples (Table 45). Apples were washed and the stems were removed. Fruit halves were peeled with a standard peeling knife. Cold juice was produced from apple halves (with skin). Juice was heated to 75 ºC before cooling to produce pasteurized juice. Pomace was produced during juice preparation. Apple halves (with skin) were cooked in a pressure cooker to produce sauce. Indoxacarb residues did not appear in the juice, but did appear in the pomace.

Table 45. Indoxacarb residues in apples and processed fractions resulting from supervised trials in Germany, Italy and USA with indoxacarb 3S+1R and racemic indoxacarb. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

APPLES country, year (variety)	Application 1/					PHI days	Commodity	Residues, mg/kg 2/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 1995 (Jonagold)	WG racemic	0.05	0.005	1000	6	28	fruit peeled fruit pomace sauce juice	0.07 0.09 0.07 0.07 < 0.02 (4) 0.20 0.19 < 0.02 (2) < 0.02 (2)	AMR 3389-95
Germany, 1996 (Idared)	WG 3S+1R	0.052	0.005	1000	6	0 14	fruit fruit peeled apple juice pomace sauce	0.08 0.11 0.06 0.07 < 0.02 (2) < 0.02 (6) 0.20 0.27 < 0.02 (2)	AMR 4016-96
Germany, 1996 (Idared)	WG racemic	0.053	0.005	1030	6	0 14	fruit fruit peeled apple juice pomace sauce	0.12 0.13 0.09 0.10 < 0.02 (2) < 0.02 (4) 0.30 0.33 < 0.02 (2)	AMR 4016-96
Italy, 1995 (Golden Delicious)	WG racemic	0.05	0.006	800	6	28	fruit pomace sauce juice juice pasteurised	0.14 0.14 0.22 < 0.02 < 0.02 0.02 0.02 0.02	AMR 3389-95
USA (CA), 1995 (Red Rome)	WG racemic	0.37		1900	4	7	unw RAC washed RAC pomace wet juice	1.0 0.82 2.4 (30.9% DM) < 0.02	AMR 3293-95
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.37		1870	4	7	fruit unw RAC washed RAC pomace wet juice	0.47 0.39 0.96 0.51 2.0 (26% DM) < 0.02	AMR 3952-96
USA (CA), 1996 (Red Delicious)	WG 3S+1R	0.75		1870	4	7	fruit unw RAC washed RAC pomace wet juice	0.67 0.93 1.7 0.96 4.4 < 0.02	AMR 3952-96

Table 46. Indoxacarb residues in peaches and processed fractions resulting from supervised trials in France and Italy with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

PEACH country, year (variety)	Application 1/					PHI days	Commodity	Residues, mg/kg 2/ indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
France, 2000 (Promesse)	WG 3S+1R	0.093	0.005	1860	4	7	peaches washed RAC canned juice juice of puree jam puree pressed pulp	0.05 0.04 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	DuPont-4310
Italy, 2000 (Cresthaven)	WG 3S+1R	0.089	0.005	1870	4	7	peaches canned juice juice of puree jam puree pressed pulp	0.09 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	DuPont-4310
Italy, 2000 (Franca)	WG 3S+1R	0.094	0.005	1980	4	7	peaches washed RAC canned juice juice of puree jam puree pressed pulp	0.12 0.10 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	DuPont-4310

Carringer (2003, DuPont-9878) described the processes for producing raisins and juice from treated Thompson Seedless grapes in a trial in California, USA. Grape bunches for raisin production were spread on trays and allowed to dry in the sun in daylight hours for approximately 5 weeks when the moisture level was measured at 15.9%. The grapes were then placed in plastic bags and stored at 21°C for 6 days ready for destemming and cap removal. The dried grapes were washed in water and rehydrated (17.4% measured moisture) ready for freezer storage until residue analysis. Grapes for juice production were passed through a crusher-destemmer to produce a crushed berry and juice mixture which was treated with a pectinase enzyme and heated at 48–60°C for 2 hours. The depectinized slurry was pressed and the unclarified juice was heated to inactivate the pectinase enzyme and then cooled ready for refrigerated storage for 50 days to allow sediment to form and settle. The settled juice was then filtered through a diatomaceous earth filter aid and then heated to canning temperature (92–93°C) for 3 minutes and sealed in the can. Residue data are summarised in Table 47.

Jernberg (2002, DuPont-7193), in grape processing trials in Italy and France, treated grape vines with indoxacarb 3S+1R 3 times at 0.06 kg ai/ha and harvested grapes 10 days after the third application for wine production. Grapes were crushed and stemmed and the crushed grapes were retained in a stainless steel tank where potassium metabisulphite (0.07 g/L) was added. Dry active yeast (0.1 g/L) was added to the must and alcoholic fermentation was followed by measurement of density, temperature and pH. Because the alcohol content was insufficient, white sugar was added. Alcoholic fermentation was judged complete from the density of the must and the AF wine (alcoholic fermentation wine) was run off and also obtained by pressing the remaining solid material, to produce wet pomace. Wet pomace was dried for 3 days at 60ºC to produce dry pomace. The wine was inoculated with lactic bacteria and subjected to malolactic fermentation in the absence of air and was then treated with potassium metabisulphite (0.1 g/L) to produce MF wine (malolactic fermentation wine). The wine was subjected to a clarification and storage process followed by filtration to produce the final product. Residue data are summarised in Table 47.

Guinivan and Weidenauer (1997, AMR 3388-95), in grape processing trials in France and Germany, treated grape vines with racemic indoxacarb 3 times at 0.045 kg ai/ha and harvested grapes 27, 28 and 38 days after the third application for wine and dried raisin production. In the white wine trials, grapes were pressed and separated into must and wet pomace. The must was subjected to alcoholic fermentation and natural clarification to produce AF wine, which went through further steps of clarification, cold storage, filtration and bottling. In the red wine procedure the step of malolactic fermentation was added after the production of AF wine. Dry pomace was produced by drying wet pomace at 60ºC for 2–3 days. Juice was produced from grapes by crushing and stemming, depectinization, clarification, filtration and sterilization. Raisins were produced by drying grapes at 60ºC for 4–5 days followed by stemming. Residue data are summarised in Table 47.

Table 47. Indoxacarb residues in grapes and processed products resulting from supervised trials in France, Germany, Italy and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

GRAPES country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer	Ref
France, 1995 (Gamay)	WG racemic	0.045	0.011	430	3	38	grapes must wet pomace dry pomace red wine bottled wine juice raisin	0.17 0.12 0.26 0.98 < 0.02 (2) < 0.02 < 0.02 0.60	AMR 3388-95
France, 1995 (Sauvignon)	WG racemic	0.046	0.011	410	3	28	grapes must wet pomace dry pomace AF white wine bottled wine juice raisin	0.20 0.07 0.19 0.62 < 0.02 < 0.02 < 0.02 0.38	AMR 3388-95
France, 2001 (Cabernet Sauvignon)	WG 3S+1R	0.063	0.0047	1350	3	10	berries stems must wet pomace dry pomace AF wine MF wine wine	0.10 0.11 0.17 0.14 0.16 0.12 0.16 0.65 0.53 0.54 0.78 0.01 < 0.004 < 0.004 (3)	DuPont-7193
Germany, 1995 (Riesling)	WG racemic	0.045	0.006	800	3	27	grapes must wet pomace wine wine aged	0.28 0.02 0.45 < 0.02 < 0.02 (2)	AMR 3388-95

GRAPES country, year (variety)	Application					PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Italy, 2001 (Cabernet Sauvignon)	WG 3S+1R	0.061	0.005	1320	3	10	berries stems must wet pomace dry pomace AF wine MF wine wine	0.11 0.092 0.12 0.11 0.16 0.17 0.16 0.47 0.42 0.46 0.66 0.004 < 0.004 < 0.004 (3)	DuPont-7193
USA (CA), 2002 (Thompson Seedless)	WG 3S+1R	0.62		670	4	7	grapes raisins grape juice	1.16 1.52 3.22 4.10 0.007 0.0115	DuPont-9878

1/ AF: alcoholic fermentation. MF: malolactic fermentation.

Adams and Klemens (1997, AMR 3290-95), in processing trials in USA, treated tomatoes with racemic indoxacarb at 5× label rate and harvested tomatoes 3 days after the fourth application for processing into puree and paste. Washing did not influence the tomato residue level. Residues in puree were much the same as in the tomatoes while residues in paste were about 3 times as high corresponding to the change in moisture level. Tomatoes (476 lb, 216 kg) were processed in a manner simulating commercial practice. Tomatoes were washed in chlorinated water followed by a fresh water spray rinse. Washed tomatoes were crushed and heated to 91°C and pressed through a screen to remove peel and seeds (wet pomace) and to yield juice. Juice was evaporated to produce puree containing 10% natural tomato soluble solids. A portion of puree was evaporated in a vacuum kettle to produce paste containing 33% natural tomato soluble solids. Residue data are summarised in Table 48. Adams and Klemens (1997, AMR 3735-96) treated tomatoes with indoxacarb 3S+1R at 5× label rate and processed the tomatoes (301 lb, 137 kg) in the same way as described above. Residue data are summarised in Table 48.

Guinivan *et al.* (1997, AMR 3390-95), in processing trials in Europe, treated tomatoes with racemic indoxacarb and harvested tomatoes 13-14 days after the sixth application for processing into juice, concentrate, pomace and catsup. Pooled samples of approximately 6–8 kg were processed, beginning with washing with tap water and crushing. The crushed fruit were then heated to boiling for 5 minutes and filtered through a 2.5 mm sieve to produce juice and pomace. A portion of the whey pomace was dried in a vacuum oven at 80°C for 48 hours to produce dry pomace of 98% dry matter. A portion of juice was concentrated by cooking at atmospheric pressure to produce puree containing approximately 15% dry matter. Tomato puree was mixed with 6% sugar, 5% vinegar and 1% salt and then concentrated on a hotplate to approximately 32% dry matter to produce catsup. The distribution of residues to tomato processed fractions is summarised in Table 48.

Table 48. Indoxacarb residues in tomatoes and processed fractions resulting from trials in Italy, Spain and USA with racemic indoxacarb or indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

TOMATOES country, year (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
Italy, 1995 (Red Stetter)	WG racemic	0.10	0.015	700	6	13	fruit juice puree dry pomace wet pomace catsup	0.02 0.01 0.02 < 0.01 (3) 0.04 0.03 0.03 1.7 1.9 1.8 1/ 0.20 0.23 0.27 1/ 0.06 0.06 0.05	AMR 3390-95
Spain, 1995 (Prieto)	WG racemic	0.17	0.017	1000	6	14	fruit juice puree dry pomace wet pomace catsup	0.05 0.04 0.07 < 0.01 (3) 0.04 0.04 0.04 3.2 4.0 3.3 1/ 0.31 0.40 0.37 1/ 0.11 0.11 0.11	AMR 3390-95
USA (CA), 1995 (Cal Ace)	WG racemic	0.37 5×label		250	4	3	fruit (RAC) RAC washed puree paste	0.68 0.70 0.71 0.65 0.80 0.61 0.64 2.0 2.4	AMR 3290-95
USA (CA), 1996 (Halley 3155)	WG 3S+1R	0.37 5×label		360	4	3	fruit (RAC) RAC washed puree paste	0.59 0.27 0.15 0.083 (6 analyses) 0.078 (5 analyses) 0.21 (5 analyses)	AMR 3734-96

1/ Concentrations in pomace are unrealistically high for the concentration in the RAC.

Gagnon and Guinivan (1999, AMR 4903-98), in processing trials in USA, treated potatoes with indoxacarb 3S+1R at 5× label rate and harvested potatoes 7 days after the fourth application for processing into chips and flakes. Potatoes were tub washed and inspected, with culls removed at this stage. Washed potatoes were batch peeled and inspected and trimmed to remove rot, green or damaged tissue. The peeled potatoes were sliced with a restaurant style slicer, placed in a tub of hot water to remove free starch and fried at 177°C for 90 seconds to produce chips, which were then drained and salted. Washed potatoes were steam peeled and scrubbed, then cut into slabs which were washed in cold water to remove starch before cooking at 70–77°C for 20 minutes in a steam-jacketed kettle. The slabs were then cooked at 94–100°C in a blancher/sterilizer and mashed. The mash was mixed with food additives and dried into a thin sheet which was milled into potato flakes. Residues in the RAC and the processed commodities were below the LOQ from the 5× label treatment (

Table 50), so are unlikely to appear in processed potato commodities from potatoes subject to label rate treatments.

Table 49. Indoxacarb residues in potatoes and processed fractions resulting from trials in USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

POTATOES country, year (variety)	Application Form	kg ai/ha	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg indoxacarb + R enantiomer	Ref
USA (WA), 1998 (Russet Burbank)	WG 3S+1R	0.36 5×label	200	4	7	potatoes (RAC) RAC unwashed RAC washed culls chips flakes wet peel	< 0.01 (2) Note 1/ < 0.01 (2) < 0.01 (2) < 0.01 (2) < 0.01 < 0.01 < 0.01	AMR-4903-98

1/ Potatoes processing, AMR-4903-98. Some samples of potatoes and processed commodities had detected residues, but not above the LOQ (0.01 mg/kg).

Devine (2000, AMR 4904-98), in processing trials in USA, treated soybeans with indoxacarb 3S+1R at 5× label rate and harvested soybeans 23 days after the fourth application for processing into hulls, meal and oil. Soybeans (144 lb, 65 kg) were dried at 54−71°C until moisture content reached 11−15%. Light impurities were removed with an aspirator and whole soybeans milled and separated by an aspirator into hull and kernel fractions. Kernel material was dried at 54-71°C and crude oil was extracted with hexane. Crude oil was refined according to AOCS method Ca 9b-52 to produce refined oil and soapstock. Residue data are summarised in

Table 50.

Desmond and Guinivan (2000, AMR 4551-97), in processing trials in USA, treated peanuts with indoxacarb 3S+1R at 5× label rate and harvested peanuts 14 days after the fourth application for processing into oil and meal. Unshelled peanuts (69 lb, 31 kg) were dried to a moisture level of 7-12% for cleaning and then shelling to produce kernels. Kernels were dried at 54-71°C to a final moisture level of 7−10%, then conditioned to 12% moisture, heated to 93-104°C and pressed to produce crude oil. Further oil was extracted with hexane. Crude oil was refined by AOCS method Ca 9a-52 to produce refined oil and soapstock. Residue data are summarised in

Table 50.

Klemens (1997, AMR 3948-96), in processing trials in USA, treated cotton with indoxacarb 3S+1R at 5× label rate and harvested seed cotton 13 days after the fourth application for processing into oil and meal in a manner that simulated commercial processing. Seed cotton (155 lb, 70 kg) was first cleaned to remove trash such as burrs, leaves and sticks. Most of the lint was then removed by a saw gin. After delinting, approximately 3% of the lint remained with the seed. A huller was used to remove the hulls from the kernel material, which was then dried at 54-71°C to bring the moisture content below 12%. The kernel material was then heated and flaked and crude oil was extracted with hexane. Residue data are summarised in

Table 50.

Table 50. Indoxacarb residues in oilseeds and processed fractions resulting from trials in USA with indoxacarb 3S+1R. Application is expressed as indoxacarb, while residues are expressed as indoxacarb + R enantiomer.

OILSEEDS country, year (variety)	Application Form	kg ai/ha	water (L/ha)	no.	PHI days	Commodity 1/	Residues, mg/kg indoxacarb + R enantiomer	Ref
COTTON								
USA (MS), 1996 (DPL 51)	SC 3S+1R	0.15	94	4	13	undelinted seed	0.34 86% DM	AMR 3948-96
USA (MS), 1996 (DPL 51)	SC 3S+1R	0.75	94	4	13	undelinted seed hulls meal refined oil	7.2 85% DM 0.19 96% DM 0.01 86% DM 0.26	AMR 3948-96
PEANUTS								
USA (GA), 1997 (GK-7)	SC 3S+1R	0.62 5×label	100	4	14	peanut kernel kernel, at process oil meal	0.007 0.013 0.013 0.005	AMR 4551-97
SOYBEANS								
USA (IL), 1998 (CX205 Dekalb)	SC 3S+1R	0.63 5×label	150	4	23	soybean grain hulls 99.9% DM meal 99.9% DM refined oil	0.066 0.071 0.086 0.63 < 0.01 0.049	AMR 4904-98

1/ DM: dry matter.

Table 51. Summary of processing factors for indoxacarb residues. The factors are calculated from the data recorded in tables in this section.

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors. 1/	Mean or best estimate
Apples	Washed apples Wet pomace Apple Juice Apple Sauce	0.53, 0.56, 0.82 2.1, 2.6, 2.4, 2.6, 1.6, 3.6, 3.3 < 0.02, < 0.01, < 0.02, < 0.3, 0.14, < 0.3, < 0.2 < 0.3, <0.14, <0.3, <0.2	0.64 2.6 0.05 0.2
Peach	Peach juice Canned peaches Peach puree	< 0.08, < 0.11, < 0.20 < 0.08, < 0.11, < 0.20 < 0.08, < 0.11, < 0.20	0.08 0.08 0.08
Grapes	Raisins Grape juice Wet pomace Dry pomace Wine	2.7, 1.9, 3.5 0.007 4.2, 4.5, 0.95, 1.5, 1.6 6.1, 6.2, 3.1, 5.8 0.037, 0.08, < 0.1, < 0.1, < 0.07	2.7 0.007 2.6 5.3 0.06
Tomatoes	Washed tomatoes Tomato puree Tomato paste Tomato juice Catsup	1.04, 0.25 0.91, 0.23, 0.75, 2.0 3.2, 0.62 < 0.2, < 0.6 2.1, 3.4	0.65 0.97 1.9 0.2 2.8
Potatoes		no residues in RAC	
Undelinted cotton seed	Cotton seed hulls Cotton seed meal Cotton seed refined oil	0.026 0.0014 0.036	0.026 0.0014 0.036
Peanut kernels	Peanut oil	1	1

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors. 1/	Mean or best estimate
	Peanut meal	0.39	0.39
Soybean grain	Soybean hulls Soybean meal Soybean refined oil	8.5 < 0.14 0.66	8.5 0.14 0.66

1/ 'Less-than' (<) values are derived from cases where residues were not detected in the processed commodity. The 'less-than' processing factor is then calculated from the LOQ of the analyte in the processed commodity and the residue in the raw agricultural commodity.

RESIDUES IN ANIMAL COMMODITIES

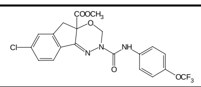
Farm animal feeding studies

The meeting received a lactating dairy cow feeding study, which provided information on likely residues resulting in animal tissues and milk from residues in the animal diet.

Groups of 3 or 4 lactating Holstein cows (animals weighing 512-695 kg initially) were dosed daily via gelatin capsule with indoxacarb 3S+1R at 7.5 (1×), 22.5 (3×) and 75 ppm (10×) in the dry-weight diet, for 28 consecutive days (Amoo, 1997, AMR 3820-96). Milk was collected twice daily for analysis. On day 29, all except for one 10 × dose animal were slaughtered for tissue collection. Tissues collected for analysis were liver, kidney, perirenal fat, omental fat, round muscle and tenderloin muscle. Milk was collected from the remaining animal, no longer dosed after day 28, up to the day of slaughter, day 43. Animals consumed approximately 21-22 kg dry-weight feed each per day and produced at least 18.8 kg milk per animal per day (measured on acclimation days 11−13). Samples were analysed by HPLC method AMR 3337-96. Doses are expressed as indoxacarb 3S+1R and residue concentrations are expressed as indoxacarb + R enantiomer.

Indoxacarb is clearly a fat soluble compound, with residues in milk mostly residing in the cream fraction and residues in fat tissue much higher than residues in other tissues.

Table 52. Residues of indoxacarb with R enantiomer and metabolite IN-JT333 in milk, skim milk and cream from lactating dairy cows dosed with indoxacarb 3S+1R at 7.5 (1×), 22.5 (3×) and 75 ppm (10×) in the dry-weight diet, for 28 consecutive days (Amoo, 1997, AMR 3820-96). Reported values are means of 3 values for the 7.5 and 22.5 ppm groups and of 4 values in the 75 ppm group.

Day	7.5 ppm group (1×)			22.5 ppm group (3×)			75 ppm group (10×)		
	milk	skim milk	cream	milk	skim milk	cream	milk	skim milk	cream
	Indoxacarb + R enantiomer, mg/kg								
1	0.010			0.015			0.069		
4	0.018			0.050			0.15		
7	0.015			0.046			0.12		
10	0.014			0.053			0.13		
14	0.020	0.007	0.22	0.054	0.012	0.60	0.18	0.038	2.0
18	0.019			0.048			0.17		
21	0.020	0.007	0.20	0.052	0.025	0.51	0.18	0.049	1.9
24	0.017			0.058			0.19		
28	0.021	0.008	0.21	0.054	0.022	0.59	0.19	0.078	2.2
	Metabolite IN-JT333 , mg/kg 								
1	< 0.01			< 0.01			< 0.01		
4	< 0.01			< 0.01			< 0.01		
7	< 0.01			< 0.01			< 0.01		
10	< 0.01			< 0.01			< 0.01		

Day	7.5 ppm group (1×)			22.5 ppm group (3×)			75 ppm group (10×)		
	milk	skim milk	cream	milk	skim milk	cream	milk	skim milk	cream
14	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.022	< 0.01	< 0.01	0.065
18	< 0.01			< 0.01			< 0.01		
21	< 0.01	< 0.01	0.01	< 0.01	< 0.01	0.018	< 0.01	< 0.01	0.061
24	< 0.01			< 0.01			0.01		
28	< 0.01	< 0.01	0.018	< 0.01	< 0.01	0.027	< 0.01	0.01	0.075

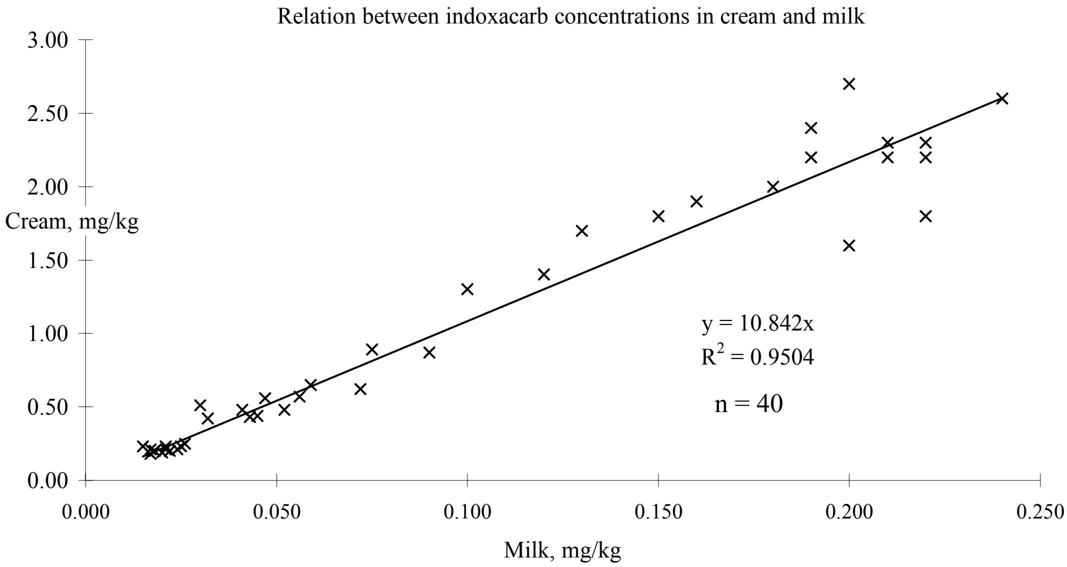


Figure 6. Relation between indoxacarb (+ R enantiomer) residues in cream and in whole milk from a feeding study on dairy cows.

Table 53. Residues of indoxacarb with R enantiomer and metabolite IN-JT333 in tissues from lactating dairy cows dosed with indoxacarb 3S+1R at 7.5 (1×), 22.5 (3×) and 75 ppm (10×) in the dry-weight diet, for 28 consecutive days and slaughtered on day 29 (Amoo, 1997, AMR 3820-96).

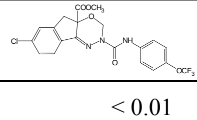
Tissue	7.5 ppm group (1×)		22.5 ppm group (3×)		75 ppm group (10×)	
	individuals	mean	individuals	mean	individuals	mean
	Indoxacarb + R enantiomer, mg/kg					
Muscle	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01	0.093 0.030 0.076	0.066
Fat	0.22 0.24 0.20	0.22	0.50 0.54 0.30	0.45	1.9 1.8 1.9	1.9
Liver	< 0.01 (3)	< 0.01	< 0.01 < 0.01 0.013	0.01	0.019 0.019 0.017	0.018
Kidney	< 0.01 (3)	< 0.01	0.018 0.012 0.020	0.017	0.049 0.036 0.032	0.039
	Metabolite IN-JT333 , mg/kg 					
Muscle	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01
Fat	0.013 0.011 < 0.01	0.011	0.027 0.028 0.035	0.030	0.070, 0.090, 0.080	0.080
Liver	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01
Kidney	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01	< 0.01 (3)	< 0.01

Table 54. Residues of indoxacarb (+ R enantiomer) and metabolite IN-JT333 in milk and tissues from the depuration animal dosed with indoxacarb 3S+1R at 75 ppm (10×) in the dry-weight diet, for 28 consecutive days and then fed with control feed until slaughter on day 43 (Amoo, 1997, AMR 3820-96).

Matrix	Study day	indoxacarb + R enantiomer, mg/kg	IN-JT333, mg/kg
Whole milk	29	0.061	< 0.01
Whole milk	30	0.028	< 0.01
Whole milk	32	0.010	< 0.01
Whole milk	34	< 0.01	< 0.01
Whole milk	36	< 0.01	< 0.01
Whole milk	40	< 0.01	< 0.01
Muscle	43	< 0.01	< 0.01
Fat	43	0.079	< 0.01
Liver	43	< 0.01	< 0.01
Kidney	43	< 0.01	< 0.01

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

No information was received on residues of indoxacarb in food in commerce or at consumption.

APPRAISAL

Indoxacarb was considered for the first time by the present meeting. It is an indeno-oxadiazine insecticide that is used for control of lepidoptera and other pests.

Indoxacarb, chemical name (IUPAC) (S)-7-chloro-3-[methoxycarbonyl-(4-trifluoromethoxy-phenyl)-carbamoyl]-2,5-dihydro-indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylic acid methyl ester, is a new insecticidal active ingredient.

Indoxacarb was originally marketed as a racemic mixture of indoxacarb with its R enantiomer. Subsequently, a commercial technical material was developed that contained 3 parts indoxacarb and 1 part R enantiomer. For the purposes of this report the original material will be described as "racemic indoxacarb" and the later material will be described as "indoxacarb 3S+1R". Residues, where the two enantiomers are not in a defined ratio, will be described as "indoxacarb + R enantiomer".

Animal metabolism

The Meeting received the results of animal metabolism studies in rats, lactating dairy cows and laying hens.

When rats were orally dosed with indoxacarb it was readily absorbed followed by extensive metabolism and excretion. Loss of a methoxycarbonyl group produced IN-JT333 (methyl 7-chloro-2,5-dihydro-2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylate) a major metabolite in the fat. (See the toxicology report for more details of laboratory animal metabolism.)

When lactating dairy cows were orally dosed with labelled racemic indoxacarb (labelled in the indanone ring or the trifluoromethoxyphenyl ring) for 5 consecutive days at 200 mg/animal/day, equivalent to 10 ppm in the feed, most of the administered 14C was excreted in the faeces (53–60%)

and urine (19–20%). 14C recovery was adequate (74% and 82% for the two labels). Residues in milk and tissues accounted for 0.7–0.8% and 0.79–0.84% of the dose respectively.

Parent compound was the major identified component of the residue in milk and each of the tissues. Chiral HPLC analysis of parent compound in milk (day 5 and pooled) and kidneys showed S:R enantiomer ratios of 2:1 and 2-2.5:1 respectively, a change from the starting ratio of 1:1.

The concentration of parent compound was substantially higher in the perirenal fat than in the other tissues suggesting that indoxacarb is a fat-soluble compound.

Metabolite IN-JT333 was present in perirenal fat at levels equivalent to 7% and 11% of parent compound levels. A number of other metabolites were identified in the liver.

When laying hens were orally dosed with labelled racemic indoxacarb (labelled in the indanone ring or the trifluoromethoxyphenyl ring) for 5 consecutive days at 1.2 mg/bird/day, equivalent to 10 ppm in the feed, most of the administered 14C was excreted in the faeces (87–88%). 14C recovery was 89% and 90%. Residues in eggs and tissues accounted for 0.28–0.4% and 1.3–1.4% of the dose respectively.

More residue appeared in the egg yolk than in the egg white, suggesting a tendency for fat solubility of the residue components. Parent compound constituted 3–4% of the total 14C in egg yolk. Major metabolites in egg yolk were IN-KG433 + IN-KT319 ((E)- and (Z)-methyl 5-chloro-2,3-dihydro-2-hydroxy-1-[[[(methoxycarbonyl)[4-(trifluoromethoxy)phenyl]amino]carbonyl]hydrazono]-1H-indene-2-carboxylate) at 18-26% of total 14C and Metabolite F (proposed identification as 1-(3-(6-chloro-1-hydroxy-2-methoxycarbonylindene)-4-(4-trifluoromethoxyphenyl)-1,2,4-triazole-2,3,4,5-tetrahydro-3,5-dione) at 7–14% of total 14C.

Fat contained the highest concentration of residue, where the main component, Metabolite F constituted 45 and 38% of the total 14C in the fat. Parent compound constituted 5 and 6% of the total 14C in the fat. Metabolite IN-JT333 constituted 16 and 18% of the total 14C in the fat. Residues in breast muscle and thigh muscle were generally too low for metabolite identification. Parent compound accounted for approximately 4–5% of the total 14C in liver.

The residue in hens was fat-soluble but the residue composition in poultry fat was somewhat different from the residue composition in dairy cow fat.

Although there were similarities in the metabolic pathways in dairy cows and in poultry, there were also notable differences, e.g. a major metabolite, metabolite F in chicken fat, was not identified in dairy cow fat. In dairy cow fat, parent compound comprised 65–80% of the total residue with IN-JT333 the only identifiable metabolite at 5–7% of the total residue. In poultry fat, parent compound comprised 4–6% of the total residue with metabolite IN-JT333 at 17% of total residue. Other identified metabolites comprised 69–76% of the total residue.

Plant metabolism

The Meeting received plant metabolism studies with racemic indoxacarb on cotton, lettuce, grapes and tomatoes.

In each crop tested, parent compound mostly represented more than 90% of the total 14C residue and was essentially the only compound detected. In grapes and tomatoes the residue was found to be mostly a surface residue. Chiral HPLC analysis of the residues in tomatoes showed that the enantiomers remained in a 1:1 ratio.

When cotton plants were treated with a single application of formulated [14C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring, parent compound mostly represented more than 90% of the total 14C residue in plant samples taken 7, 14, 30, 59 and 90 days after treatment. Chiral analysis of parent compound demonstrated that it remained racemic.

When lettuce plants were treated with a single application of formulated [14C]racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring, parent compound mostly represented more than 95% of the total 14C residue in plant samples taken 0, 7, 14, 21, 28 and 35 days after treatment. Even on day 0 less than half of the residue was on the leaf surface and the percentage on the surface decreased further with time after treatment.

Grape vines at the early fruit development stage were treated with a single foliar application of formulated [14C] racemic indoxacarb, labelled in the indanone ring or the trifluoromethoxyphenyl ring. Most of the residue associated with fruit sampled on days 0, 14, 46 and 66 days (mature) post-treatment was surface residue, with 52% and 75% still surface residues 66 days after treatment. Parent compound was essentially the only component of the residue at all times.

When tomato vines were treated with 4 foliar applications, approximately 6–10 days apart, of formulated [14C]racemic indoxacarb, labelled in the trifluoromethoxyphenyl ring, the majority of the residue associated with the fruit sampled 3, 7 and 14 days after the final application was surface residue, mostly around 90% of the residue. Parent compound was essentially the only component of the residue at all times. Parent compound isolated from leaf extracts from the samples collected before the second application and at harvest, 14 days after final application, were subjected to chiral HPLC analysis, which demonstrated that the two enantiomers remained in a 1:1 ratio.

Environmental fate in soil

The Meeting received information on the environmental fate of indoxacarb in soil, including studies on aerobic soil metabolism, field dissipation and crop rotational studies.

When [14C]racemic indoxacarb labelled in the indanone ring or the trifluoromethoxyphenyl ring was incubated with a silt loam soil under aerobic conditions in the dark at 25°C, indoxacarb degraded quickly (half-life approximately 2-3 days). Identifiable metabolites were a minor part of the residue and mostly also degraded relatively quickly. IN-JT333 and IN-KG433 were the main metabolites in the first few days. IN-MK643 (1,2-dihydro-5-(trifluoromethoxy)-2H-benzimidazol-2-one) was identified as a longer term metabolite. The indanone ring was mineralized more quickly (26% in 120 days) than the trifluoromethoxyphenyl ring (5.4% in 120 days). The non-extractable 14C had begun to decline within 90 days.

Very little of the applied indoxacarb moved below the top 15 cm of the soil during field dissipation trials of duration up to 18 months with [14C]labelled racemic indoxacarb applied to 4 different soils. Indoxacarb (+ R enantiomer) concentrations declined to half of their initial values in seven days to six months.

In a field persistence and mobility study at two sites with racemic indoxacarb, residues of indoxacarb + R enantiomer disappeared from the top 15 cm of soil with half-lives of 55 and 60 days. Residues did not occur at lower depths except occasionally and intermittently. Metabolite IN-JT333 reached its peak concentration on days 14 and 100 at the 2 sites. Metabolite KG-433 was detected at a low concentration at one site.

In a confined rotational crop study in USA, soil was treated directly with [14C]racemic indoxacarb labelled in the indanone ring or the trifluoromethoxyphenyl ring. Crops of carrots, lettuce, wheat and soybeans were sown into the treated soil at intervals of 36, 90 and 125 days after treatment and were grown to maturity and harvested for analysis. No parent compound or potential metabolite

(IN-JT333) was detected. Low levels (≤ 0.05 mg/kg) of unidentifiable components were observed, with different patterns for the two different label positions suggesting that the parent compound was fragmented.

Methods of analysis

The Meeting received descriptions and validation data for analytical methods for residues of indoxacarb in raw agricultural commodities, processed commodities, feed commodities, animal tissues, milk and eggs.

Methods rely on HPLC-UV, GC-ECD and GC-MSD for analysis of indoxacarb in the various matrices. Indoxacarb and its R enantiomer are determined and reported together in all these methods. Signal enhancement by extracts of some matrices may require the preparation of standards in matrix extracts for measurement at low concentrations. A method with LOQ values of 0.2–0.3 mg/kg and not requiring that standards are prepared in control matrix solutions was provided as suitable for enforcement. A method suitable for enforcement for animal commodities (LOQ values 0.01–0.03 mg/kg) was adapted from existing method DFSG S19.

Numerous recovery data on a wide range of substrates were provided from validation testing of the methods, which showed that the methods were valid over the relevant concentration ranges.

Extraction efficiency has been proven with various solvent mixtures on [14C]indoxacarb incorporated into or incurred in crop and animal commodities. Extraction procedures used either ethyl acetate – water or acetonitrile – hexane.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the freezer storage stability of residues of racemic indoxacarb and indoxacarb 3S+1R in alfalfa, apple juice, apple pomace, apples, fat, grape pomace, grapes, lettuce, liver, milk, muscle, peanut hay, peanut kernels, peanut meal, peanut oil, sweet corn, sweet corn forage, sweet corn stover, tomatoes and wine.

Residues were stable (less than 30% disappearance) during the storage intervals tested, mostly 6 months, 12 months or 18 months. Storage data was available for some animal commodities for only shorter intervals, 2–3 months, but which were suitable for the purpose of demonstrating stability of the residues in samples from the studies.

Definition of the residue

The composition of the residue in the metabolism studies, the available residue data in the supervised trials, the toxicological significance of metabolites, the capabilities of enforcement analytical methods and the national residue definitions already operating all influence the decision on residue definition. [Check the significance of metabolites with WHO Group].

Residues of indoxacarb are described as the sum of indoxacarb and its R enantiomer in national residue definitions.

In crop residue situations, parent compound comprises most of the residue and, at least in some situations, its enantiomer composition is unchanged.

In dairy cows, particularly in the fat, milk and kidney, parent compound is the major part of the residue. In liver, parent is the major identified compound in the residue. The parent residue becomes more enriched in S enantiomer (indoxacarb) in some animal commodities. Metabolite IN-

JT333 was present in fat at levels of 7–11% of parent compound levels. Because of its toxicity, it should be included in the residue definition for risk assessment for animal commodities.

In poultry tissues and eggs, parent compound is a minor component of the residue and no single metabolite would be a good indicator of the residue level. Under the present dietary burden, even the total residues in poultry are estimated to be very low and unlikely to be detectable.

Available analytical methods and supervised trial data suggest that "indoxacarb and its R enantiomer" is a practical residue definition.

In the animal metabolism studies, the concentration of residue was clearly higher in the fat than in other tissues. In milk the residue partitioned into the lipid phase. The octanol-water partition coefficient (log POW = 4.65) also suggests that indoxacarb is a fat-soluble compound.

The Meeting recommended a residue definition for indoxacarb for plants and animals.

Definition of the residue (for compliance with the MRL for all commodities and for estimation of dietary intake for plant commodities): sum of indoxacarb and its R enantiomer. The residue is fat soluble.

Definition of the residue (for estimation of dietary intake for animal commodities): sum of indoxacarb, its R enantiomer and methyl 7-chloro-2,5-dihydro-2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylate, expressed as indoxacarb.

Results of supervised trials on crops

The Meeting received supervised trials data for indoxacarb uses on apples, pears, stone fruits, grapes, cabbages, cauliflowers, broccoli, Brussels sprouts, lettuce, cucumbers, courgettes, melons, tomatoes, peppers, sweet corn, pulses (adzuki beans, chickpeas mung beans), soybeans, potato, peanuts, cotton seed, sweet corn forage, legume animal feeds, alfalfa and cotton gin trash.

In most trials, duplicate field samples from an unreplicated plot were taken at each sampling time and were analysed separately. For the purposes of the evaluation, the mean of the two results was taken as the best estimate of the residue from the plot.

In some trials the formulation was based on racemic indoxacarb and in others indoxacarb 3S+1R was used. In all situations, the application rate and spray concentration were expressed in terms of the active ingredient, indoxacarb. In all cases residues were measured and expressed as indoxacarb + R enantiomer.

Parallel trials (same place, same application rate, same operator, etc) between products based on racemic indoxacarb and products based on indoxacarb 3S+1R compared the resulting residues on apple, broccoli, cabbage, cauliflower, cotton, lettuce and tomato. Residue levels from the 3S+1R treatments were approximately 50% of those with the racemic treatments. Therefore, supervised residue trials with racemic indoxacarb were not used as GAP trials for MRL evaluation, except for cases like sweet corn where residues were below LOQ.

The Meeting was informed that racemic indoxacarb is currently registered in only one country.

Processing trials with racemic material were considered valid because the processing factors should not be influenced by higher residues than achieved by GAP. It is common practice to apply a pesticide at exaggerated rates in processing trials to achieve measurable levels in processed commodities.

In some trials residues were measured on samples taken just prior to the final application as well as just after it (the “zero day” residue). The residue just prior expressed as a % of zero day residue provides a measure of the contribution of previous applications to the final residue in the use pattern followed in the trial.

For apples, the average carryover of residue was 45% (Europe, n = 12). For peaches, the average carryover of residue was 38% (Europe, n = 6). For grapes, the average carryover of residue was 41% (Australia, n = 12) and 44% (Europe, n = 20). For cabbages, the average carryover of residue was 44% (Europe, n = 6) and 25% (South Africa, n = 4). For cauliflower, the average carryover of residue was 27% (Europe, n = 7). For broccoli, the average carryover of residue was 23% (Europe, n = 6). For lettuce, the average carryover of residue was 26% (Europe, n = 6). For melons-peel, the average carryover of residue was 36% (Europe, n = 10). For tomatoes, the average carryover of residue was 48% (Europe, n = 12). For peppers, the average carryover of residue was 49% (Europe, n = 9).

The final 3 applications would be expected to influence the final residue level where the carryover is approximately 50%, which means that if GAP specified a maximum of 4 applications, trials with only 1 or 2 applications would not be maximum GAP. The final 2 applications would be expected to influence the final residue level for a carryover of approximately 30-40%. Earlier applications should not have a significant influence.

Residue data was evaluated only where labels (or translations of labels) describing the relevant GAP were available to the Meeting.

Apples

Residue trials on apples were available from Australia, Belgium, France, Germany, Greece, Hungary, Italy, South Africa and USA with racemic indoxacarb or indoxacarb 3S+1R. The trials from Hungary could not be evaluated because the PHI in the trials did not match the label PHI.

Indoxacarb is registered in Australia for use on apple trees at a spray concentration of 0.0075 kg ai/hL with a PHI of 14 days. In four Australian trials in 1996 and 1998 approximating GAP (0.0075–0.009 kg ai/hL and PHI 14–15 days) residues of indoxacarb + R enantiomer were: 0.28, 0.45, 0.50 and 0.85 mg/kg.

In Belgium, indoxacarb may be used on apple trees at 0.075 kg ai/ha with harvest 7 days after the final application. In three apple trials in Belgium with application rates of 0.075 ± 30%, i.e. 0.053 to 0.098 kg ai/ha and 7 days PHI, indoxacarb + R enantiomer residues were 0.06, 0.07 and 0.09 mg/kg. In five trials in France within ± 30% of the Belgian application rate and a PHI of 7 days, the indoxacarb + R enantiomer residues were: 0.05, 0.08, 0.11, 0.13 and 0.14 mg/kg.

In Germany, indoxacarb may be used on pome fruit at 0.077 kg ai/ha with a PHI of 7 days. In three apple trials in Germany with application rates of 0.077 ± 30%, i.e. 0.054–0.100 kg ai/ha and 7 days PHI, indoxacarb + R enantiomer residues were 0.10, 0.16 and 0.24 mg/kg.

Indoxacarb is allowed for use on apples in Greece at 0.1 kg ai/ha with a PHI of 7 days. In four trials in Greece with application rates of 0.10 ± 30%, i.e. 0.070–0.13 kg ai/ha and 7 days PHI, indoxacarb + R enantiomer residues were 0.03, 0.06, 0.10 and 0.23 mg/kg.

In Italy, indoxacarb may be used on apple trees at 0.075 kg ai/ha with harvest 7 days after the final application. In 3 apple trials in Italy with application rates of 0.075 ± 30%, i.e. 0.053 to 0.098 kg ai/ha and 7 days PHI, indoxacarb + R enantiomer residues were 0.07, 0.07 and 0.21 mg/kg.

In summary, the European data for 18 trials in rank order, median underlined, were: 0.03, 0.05, 0.06, 0.06, 0.07, 0.07, 0.07, 0.08, 0.09, 0.10, 0.10, 0.11, 0.13, 0.14, 0.16, 0.21, 0.23 and 0.24 mg/kg.

Indoxacarb is registered for use on apples in South Africa with a spray concentration of 0.0075 kg ai/hL with a PHI of 28 days. In a trial at 0.0068 kg ai/hL and PHI of 28 days indoxacarb + R enantiomer residues were 1.1 mg/kg.

Indoxacarb is registered for use in USA on apples at 0.12 kg ai/ha with a PHI of 14 days. In 14 trials in USA with application rates of 0.12 ± 30%, i.e. 0.085–0.156 kg ai/ha, residues of indoxacarb + R enantiomer in rank order, median underlined, were: 0.087, 0.11, 0.12, 0.13, 0.15, 0.20, 0.21, 0.21, 0.21, 0.22, 0.23, 0.23, 0.26 and 0.30 mg/kg.

The Meeting decided that the data from Australia and South Africa were insufficient to use on their own. The Australian data was significantly different from the US data on a Mann-Whitney test. The US data was also significantly different from the European data (Mann-Whitney test) and so could not be combined.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in apples, based on the US data, of 0.5, 0.21 and 0.30 mg/kg respectively.

Pears

Indoxacarb residue trials on pears were available from Australia, South Africa and USA. The South African trials could not be evaluated because the spray concentrations used in the trials were too high compared with GAP concentrations.

Indoxacarb is registered for use on pears in Australia at a spray concentration of 0.0075 kg ai/hL with a PHI of 14 days. In one trial in Australia matching those conditions, residues of indoxacarb + R enantiomer were 0.30 mg/kg, but one trial is insufficient.

Indoxacarb is registered for use in USA on pears at 0.12 kg ai/ha with a PHI of 28 days. In 6 trials in USA with application rates of 0.12 ± 30%, i.e. 0.085-0.156 kg ai/ha, and with PHIs of 24 and 28 days, residues of indoxacarb + R enantiomer in rank order, median underlined, were: 0.042, 0.051, 0.051, 0.065, 0.067 and 0.11 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in pears, based on the US data, of 0.2, 0.051 and 0.11 mg/kg respectively.

Stone fruits

Indoxacarb residue trials on apricots, nectarines and peaches were available from Australia, France, Greece, Italy and Spain.

Indoxacarb is registered for use on apricots, nectarines and peaches in Australia at a spray concentration of 0.0075 kg ai/hL with a PHI of 7 days. In an apricot trial in Australia matching those conditions, residues of indoxacarb + R enantiomer were 1.5 mg/kg. In two nectarine trials in Australia matching those conditions, residues of indoxacarb + R enantiomer were 0.20 and 0.29 mg/kg. In one peach trial matching GAP, residues of indoxacarb + R enantiomer were 0.86 mg/kg.

In Greece, indoxacarb may be used on peach trees at 0.1 kg ai/ha with a PHI of 7 days. In three trials in Greece with application rates of 0.1 ± 30%, i.e. 0.07–0.13 kg ai/ha, residue of indoxacarb + R enantiomer were 0.12, 0.13 and 0.18 mg/kg.

In Italy, indoxacarb may be used on peach trees at 0.075 kg ai/ha with a PHI of 7 days. In four trials in Italy with application rates of 0.075 ± 30%, i.e. 0.053–0.098 kg ai/ha, residues of indoxacarb + R enantiomer were 0.06, 0.07, 0.11 and 0.16 mg/kg. In a peach trial in Spain matching Italian GAP, residues of indoxacarb + R enantiomer were 0.05 mg/kg. In a peach trial in France matching Italian GAP, residues of indoxacarb + R enantiomer were 0.10 mg/kg.

In summary, residues of indoxacarb + R enantiomer in peaches from the nine European trials in rank order, median underlined, were: 0.05, 0.060, 0.070, 0.10, 0.11, 0.12, 0.13, 0.16 and 0.18 mg/kg.

The Australian data was insufficient to support a recommendation.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in peaches, based on the European data, of 0.3, 0.11 and 0.18 mg/kg respectively.

Grapes

Indoxacarb residue trials on grapes were available from Australia, France, Germany, Greece, Hungary, Italy, Spain and USA.

In Australia, indoxacarb may be sprayed on grapes at a concentration of 0.0051 kg ai/hL with harvest 56 days after the final treatment. In three grape trials in Australia with application concentrations of 0.0051 ± 30%, i.e. 0.0036–0.0066 kg ai/hL, and PHIs of 60 and 61 days, residues of indoxacarb + R enantiomer were 0.04, 0.18 and 0.33 mg/kg.

In France, indoxacarb may be used on grapes at 0.038 kg ai/ha with harvest 10 days after the final application. In 15 grape trials in France with application rates of 0.038 ± 30%, i.e. 0.027–0.049 kg ai/ha and a PHI of 10 days, residues of indoxacarb + R enantiomer in rank order were: 0.02, 0.02, 0.02, 0.03, 0.03, 0.03, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.05, 0.05 and 0.07 mg/kg. In one German trial matching French GAP, residues were 0.03 mg/kg.

In Germany, indoxacarb may be used on wine grapes at 0.056 kg ai/ha with harvest 14 days after the final application. In three grape trials in Germany with application rates of 0.056 ± 30%, i.e. 0.039–0.073 kg ai/ha and 14 days PHI, residues of indoxacarb + R enantiomer in rank order were: 0.04, 0.06 and 0.11 mg/kg.

Indoxacarb is registered in Greece for use on grapes at 0.068 kg ai/ha with a PHI of 10 days. In a Greek trial where indoxacarb was used at 0.052 kg ai/ha with a PHI of 9 days, residues of indoxacarb + R enantiomer were 0.12 mg/kg. In a Spanish trial in line with Greek GAP, residues of indoxacarb + R enantiomer were 0.13 mg/kg. In three Italian trials at 0.56–0.58 kg ai/ha, comparable to Greek GAP, residues 10–11 days after the final application were 0.13, 0.17 and 0.22 mg/kg.

Indoxacarb is registered in Hungary for use on grapes at 0.038 kg ai/ha with a PHI of 3 days. In two trials in Hungary with application rates of 0.045 kg ai/ha (18% above label rate) and a PHI of 3 days, residues of indoxacarb + R enantiomer were 0.12 and 0.46 mg/kg.

Indoxacarb is registered in Italy for use on grapes at 0.038 kg ai/ha with a PHI of 10 days. In four trials in Italy with application rates of 0.038 ± 30%, i.e. 0.027–0.049 kg ai/ha and PHIs of 10–11 days, residues of indoxacarb + R enantiomer were 0.06, 0.11 and 0.13 mg/kg. In 2 Spanish trials in line with Italian GAP, residues of indoxacarb + R enantiomer were 0.14 and 0.19 mg/kg.

In summary, residues in the 32 European grape trials in rank order, median underlined, were: 0.02, 0.02, 0.02, 0.03, 0.03, 0.03, 0.03, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.04, 0.05, 0.05, 0.06, 0.06, 0.07, 0.11, 0.11, 0.12, 0.13, 0.13, 0.13, 0.14, 0.14, 0.17, 0.19, 0.22, 0.22 and 0.46 mg/kg.

In USA, indoxacarb may be used on grapes at 0.12 kg ai/ha with harvest 7 days after the final application. In 13 grape trials in USA matching GAP conditions, residues of indoxacarb + R enantiomer in rank order, median underlined, were: 0.09, 0.16, 0.17, 0.18, 0.26, 0.28, 0.32, 0.39, 0.42, 0.44, 0.75, 1.4 and 1.5 mg/kg.

The US grape data and the European grape data was significantly different populations (Mann-Whitney test) and could not be combined. The US grape data and the Australian grape data was not significantly different populations (Mann-Whitney test) and could be combined. In summary, the combined US and Australian data set for grapes is 0.04, 0.09, 0.16, 0.17, 0.18, 0.18, 0.26, 0.28, 0.32, 0.33, 0.39, 0.42, 0.44, 0.75, 1.4 and 1.5 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in grapes, based on the US data, of 2, 0.30 and 1.5 mg/kg respectively.

Cabbages

The meeting received information on supervised residue trials on cabbages in Australia, Belgium, Denmark, France, Germany, Greece, India, Netherlands, Portugal, Italy, South Africa, Spain, UK and USA.

In Australia, indoxacarb is registered for use on cabbages with an application rate of 0.075 kg ai/ha and a PHI of 7 days. In two Australian trials matching GAP, residues of indoxacarb + R enantiomer were < 0.02 and 0.21 mg/kg.

Indoxacarb may be used in India on cabbages at 0.04 kg ai/ha with a PHI of 7 days. In three trials in India matching GAP, residues of indoxacarb + R enantiomer were < 0.01 (2) and 0.02 mg/kg.

In South Africa, indoxacarb may be used on cabbage at 0.045 kg ai/ha with harvest 3 days after the final treatment. In four South African trials with application rates at 0.053 kg ai/ha and a PHI of 3 days, residues of indoxacarb + R enantiomer were 0.40, 0.47, 0.83 and 2.0 mg/kg.

In France, indoxacarb is registered for use on cabbages with an application rate of 0.026 kg ai/ha and a PHI of 3 days. In seven trials in France with conditions aligned with GAP, residues of indoxacarb + R enantiomer were: < 0.02 (4), 0.02, 0.05 and 0.08 mg/kg. In three trials in The Netherlands with conditions aligned with French GAP, residues were < 0.02 (2) and 0.09 mg/kg. In three trials in Belgium, Denmark and UK with conditions aligned with French GAP, residues were < 0.02 (3) mg/kg.

In Germany, indoxacarb is registered for use on cabbages with an application rate of 0.026 kg ai/ha and a PHI of 3 days. In three trials in Germany matching GAP, residues of indoxacarb + R enantiomer were < 0.02 (3) mg/kg.

In Italy, indoxacarb is registered for use on cabbages with an application rate of 0.026 kg ai/ha and a PHI of 3 days. In three trials in Italy matching GAP, residues of indoxacarb + R enantiomer were < 0.02 (3) mg/kg. In a trial in Greece with conditions matching Italian GAP, residues were < 0.02 mg/kg.

In Spain, indoxacarb is registered for use on cabbages with an application rate of 0.025 kg ai/ha and a PHI of 3 days. In a trial in Spain matching GAP, residues of indoxacarb + R enantiomer were < 0.02 mg/kg. In a trial in Portugal under conditions matching Spanish GAP, residues were < 0.02 mg/kg.

In summary, the residues in the 22 cabbage trials from Europe, in rank order, were: < 0.02 (18), 0.03, 0.05, 0.08 and 0.09 mg/kg.

In USA, indoxacarb may be used on cabbage at 0.073 kg ai/ha with harvest 3 days after the final application. In four US trials matching GAP, residues of indoxacarb + R enantiomer in cabbages with wrapper leaves were: 0.21, 0.34, 0.38 and 2.7 mg/kg.

The US and South African cabbage data appeared to be similar populations and were combined. The European data and the combined US and South African data was significantly different populations (Mann-Whitney test). In summary, the combined US and South African data set for cabbage was 0.21, 0.34, 0.38, 0.40, 0.47,0.83, 2.0 and 2.7 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in head cabbages of 3, 0.435 and 2.7 mg/kg respectively, based on the US and South African data.

Broccoli

The meeting received information on supervised residue trials on broccoli in Australia, France, Italy, South Africa, UK and USA.

Indoxacarb is registered for use on broccoli in Australia at 0.075 kg ai/ha with a PHI of 7 days. In three trials on broccoli with conditions in line with GAP, residues of indoxacarb + R enantiomer were 0.08, 0.12 and 0.23 mg/kg.

Indoxacarb is registered for use on broccoli in France at 0.026 kg ai/ha with a PHI of 3 days. In three trials on broccoli in France under conditions of GAP, residues of indoxacarb + R enantiomer were: < 0.02, 0.04 and 0.08 mg/kg. In a UK trial on broccoli in line with French GAP, residues were 0.05 mg/kg.

Indoxacarb may be used on broccoli in Spain at 0.025 kg ai/ha with harvest 3 days after the final treatment. In four indoxacarb trials on broccoli in Italy under conditions of Spanish GAP, residues were 0.03, 0.06, 0.10, and 0.14 mg/kg.

In summary, residues in broccoli in nine European trials were < 0.02, 0.03, 0.04, 0.05, 0.06, 0.08, 0.10, 0.13 and 0.14 mg/kg.

Indoxacarb may be used in South Africa at 0.045 kg ai/ha on broccoli, with a PHI of 3 days. In two broccoli trials in South Africa in line with GAP conditions, residues of indoxacarb + R enantiomer were 0.22 and 0.31 mg/kg.

Indoxacarb is registered for use on broccoli in USA at 0.073 kg ai/ha with a 3 days PHI. In two trials in USA in line with the registered use, residues of indoxacarb + R enantiomer were: 0.25, and 0.39 mg/kg.

The numbers of trials from Australia, South Africa and USA were too small, so the evaluation was based on the European data with the lower residue values. In summary, the European residue data for broccoli are: < 0.02, 0.03, 0.04, 0.05, 0.06, 0.08, 0.10 and 0.14 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in broccoli, based on the European data, of 0.2, 0.055 and 0.14 mg/kg respectively.

Cauliflower

The meeting received information on supervised residue trials on cauliflowers in Australia, Denmark, France, Germany, Greece, Italy, Netherlands, South Africa and Spain.

Indoxacarb is registered for use on cauliflowers in Australia at 0.075 kg ai/ha with a PHI of 7 days. In a trial on cauliflower with conditions in line with GAP, residues of indoxacarb + R enantiomer were < 0.01 mg/kg.

Indoxacarb is registered for use on cauliflowers in France at 0.026 kg ai/ha with a PHI of 3 days. In seven trials on cauliflowers in France under conditions of GAP, residues of indoxacarb + R enantiomer were: < 0.02 (4), 0.01, 0.05 and 0.14 mg/kg. In a cauliflower trial in Denmark under conditions of French GAP, residues were 0.03 mg/kg. In 2 cauliflower trials in The Netherlands under conditions of French GAP, residues were < 0.02 and 0.09 mg/kg.

Indoxacarb is registered for use on cauliflowers in Germany at 0.026 kg ai/ha with a PHI of 3 days. In three trials on cauliflowers in Germany under conditions of GAP, residues of indoxacarb + R enantiomer were < 0.02, 0.03 and 0.07 mg/kg.

Indoxacarb may be used on cauliflowers in Italy at 0.026 kg ai/ha with harvest 3 days after the final treatment. In a trial in Italy in line with GAP, residues of indoxacarb + R enantiomer were 0.02 mg/kg. In a cauliflower trial in Greece in line with Italian GAP, residues were < 0.02 mg/kg.

Indoxacarb may be used on cauliflowers in Spain at 0.025 kg ai/ha with harvest 3 days after the final treatment. In a trial in Spain on cauliflowers according to GAP conditions, residues of indoxacarb + R enantiomer were < 0.02 mg/kg.

In summary, residues in cauliflowers in 16 European trials, in rank order, median underlined, were: 0.01, < 0.02 (8), 0.02, 0.03, 0.03, 0.05, 0.07, 0.09 and 0.14 mg/kg.

Indoxacarb may be used in South Africa at 0.045 kg ai/ha on cauliflowers, with a PHI of 3 days. In two cauliflower trials in South Africa in line with GAP conditions, residues of indoxacarb + R enantiomer were < 0.01 and 0.04 mg/kg.

The data from the cauliflower trials from Australia (1) and South Africa (2) appear to be of the same population as the European data and may be combined: < 0.01 (2), 0.01, < 0.02 (8), 0.02, 0.03, 0.03, 0.04, 0.05, 0.07, 0.09 and 0.14 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in cauliflowers, based on the European, South African and Australian data, of 0.2, 0.02 and 0.14 mg/kg respectively.

Brussels sprouts

The Meeting received information on supervised residue trials on Brussels sprouts in Australia.

Indoxacarb is registered in Australia for use on Brussels sprouts at 0.075 kg ai/ha with a PHI of 7 days. In two trials in Australia where the use was in line with GAP, residues of indoxacarb + R enantiomer were 0.03 and 0.07 mg/kg.

Because two trials are insufficient, the meeting was unable to recommend a maximum residue level for indoxacarb on Brussels sprouts.

Cucumbers and summer squash

The Meeting received information on supervised residue trials on cucumbers in France, Greece, Italy and Spain. The Meeting also received information on 2 supervised trials on courgettes (summer squash) from Italy.

Indoxacarb is registered in Spain for field or greenhouse use on cucurbits at 0.038 kg ai/ha with a 1-day PHI. In two field trials on cucumbers in Spain under conditions matching GAP, residues of indoxacarb + R enantiomer were < 0.02 and < 0.02 mg/kg. In four greenhouse trials on cucumbers in Spain with conditions matching GAP (one trial with application rate of 0.047 kg ai/ha), residues were < 0.02 (2), 0.02 and 0.10 mg/kg. In two field trials on cucumbers in Italy under conditions matching Spanish GAP, residues were < 0.02 and < 0.02 mg/kg. In four greenhouse trials on cucumbers in France under conditions matching Spanish GAP, residues were < 0.02 (2), 0.02 and 0.03 mg/kg.

Indoxacarb is registered in Greece for field or greenhouse use on cucumbers at 0.038 kg ai/ha with a 1-day PHI. In two greenhouse trials on cucumbers in Greece with conditions matching GAP, residues of indoxacarb + R enantiomer were < 0.02 and < 0.02 mg/kg.

Indoxacarb may be used in Hungary for field or greenhouse use on cucumbers at 0.051 kg ai/ha with a 1-day PHI. In two greenhouse trials in France and one in Spain on cucumbers under conditions in line with Hungarian GAP, residues in indoxacarb + R enantiomer were 0.03, 0.03 and 0.05 mg/kg.

In summary, residues in cucumbers in four field trials from Europe were < 0.02 (4), and residues from 13 greenhouse trials in rank order, median underlined, were < 0.02 (6), 0.02, 0.02, 0.03, 0.03, 0.03, 0.05 and 0.10 mg/kg.

The Meeting agreed to use the greenhouse data set to support the MRL.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in cucumbers, based on the European greenhouse data, of 0.2, 0.02 and 0.10 mg/kg respectively.

Residues in the courgettes (summer squash) from the 2 field trials (0.07 and 0.09 mg/kg) were apparently different from the residues in cucumbers (< 0.02 (4)) in the field trials, so the data could not be combined to support a summer squash recommendation.

Melons

The Meeting received information on supervised residue trials on melons in France, Greece, Italy and Spain. Residues were measured on peel and pulp separately and the residue levels for whole fruit were calculated from the measured residues and the weights of peel and pulp.

Indoxacarb is registered in Spain for field or greenhouse use on cucurbits at 0.038 kg ai/ha with a 1-day PHI. In one field trial and 3 greenhouse trials on melons in Spain under conditions matching GAP, residues of indoxacarb + R enantiomer were 0.04 mg/kg (field) and 0.02, 0.03 and 0.04 mg/kg (greenhouse).

In four field trials and 3 greenhouse trials on melons in France with conditions matching Spanish GAP, residues of indoxacarb + R enantiomer were 0.02, 0.03, 0.03 and 0.05 mg/kg (field) and 0.02, 0.024 and 0.03 mg/kg (greenhouse).

In two field trials and 1 greenhouse trial on melons in Greece with conditions matching Spanish GAP, residues of indoxacarb + R enantiomer were 0.03 and 0.04 mg/kg (field) and 0.085 mg/kg (greenhouse).

In two field trials and two greenhouse trials on melons in Italy with conditions matching Spanish GAP, residues of indoxacarb + R enantiomer were 0.03 and 0.03 mg/kg (field) and 0.03 and 0.04 mg/kg (greenhouse).

In summary, the 9 field trials on melons produced residues of 0.02, 0.03 (5), 0.04, 0.04 and 0.05 mg/kg and the 9 greenhouse trials produced residues of 0.02, 0.02, 0.024, 0.03 (3), 0.04, 0.04 and 0.085 mg/kg.

The two data populations, field and greenhouse, are not significantly different (Mann-Whitney test) and can be combined for evaluation: 0.02 (3), 0.024, 0.03 (8), 0.04 (4), 0.05 and 0.085 mg/kg.

The Meeting estimated a maximum residue level for indoxacarb in melons, except watermelon, of 0.1 mg/kg.

Indoxacarb residues were below LOQ (0.02 mg/kg) in every sample of pulp in all the trials, so residues are unlikely to occur. In the absence of additional evidence that residues do not occur in the pulp, the Meeting estimated STMR and HR values of 0.02 mg/kg for melons.

Tomatoes

The Meeting received information on supervised residue trials on tomatoes in Australia, France, Greece, Italy, Spain and USA.

In Australia, indoxacarb may be applied to tomatoes at 0.075 kg ai/ha with a 3-days PHI. In two trials from Australia matching GAP conditions, residues of indoxacarb + R enantiomer were 0.09 and 0.12 mg/kg.

In France, indoxacarb may be applied to tomatoes in the field at 0.038 kg ai/ha with a 3-days PHI. In six trials on tomatoes in France matching GAP conditions, residues of indoxacarb + R enantiomer were < 0.02 (3), 0.03, 0.05 and 0.05 mg/kg.

In Greece, indoxacarb may be applied to tomatoes in the field or greenhouse at 0.038 kg ai/ha with a 1-day PHI. In one field trial and two greenhouse trials on tomatoes in Greece with conditions matching GAP, residues of indoxacarb + R enantiomer were 0.03 mg/kg (field) and 0.02 and 0.04 mg/kg (greenhouse).

In Spain, indoxacarb may be applied to tomatoes in the field or greenhouse at 0.038 kg ai/ha with a 1-day PHI. In three greenhouse trials on tomatoes in Spain with conditions matching GAP, residues of indoxacarb + R enantiomer were < 0.02, 0.03 and 0.03 mg/kg. In four field trials on tomatoes in Italy with conditions matching Spanish GAP, residues were 0.03, 0.03, 0.04 and 0.07 mg/kg. In one field trial and four greenhouse trials on tomatoes in France with conditions matching Spanish GAP, residues were < 0.02 mg/kg (field) and 0.02, 0.02, 0.065 and 0.065 mg/kg (greenhouse).

In summary, residues on tomatoes from 13 field trials in Europe were < 0.02, (4), 0.025, 0.03, 0.03, 0.033, 0.04, 0.045, 0.045, 0.050 and 0.070 mg/kg, and from 9 greenhouse trials < 0.02, 0.02, 0.02, 0.02, 0.03, 0.035, 0.04, 0.065 and 0.065 mg/kg. The two populations were not significantly different and could be combined: < 0.02, < 0.02, < 0.02, < 0.02, < 0.02, 0.02, 0.02, 0.02, 0.025, 0.03, 0.03, 0.03, 0.033, 0.035, 0.04, 0.04, 0.045, 0.045, 0.050, 0.065, 0.065 and 0.070 mg/kg.

In USA, indoxacarb is registered for use on tomatoes at 0.073 kg ai/ha with harvest 3 days after the final application. In six trials on tomatoes in USA under conditions matching GAP, but with intervals after treatment longer than PHI when residues were greater, residues of indoxacarb + R enantiomer in rank order, median underlined, were: 0.02, 0.05, 0.06, 0.13, 0.13 and 0.30 mg/kg.

The tomato residue data populations from Europe and US were significantly different (Mann-Whitney test) and could not be combined. The residue data from the Australian trials and the US trials appeared to be similar populations and were combined resulting in an eight trial data-set: 0.02, 0.05, 0.06, 0.09, 0.12, 0.13, 0.13 and 0.30 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in tomatoes, based on the US and Australian data, of 0.5, 0.11 and 0.30 mg/kg respectively.

Peppers

The Meeting received information on supervised residue trials on peppers in Australia, France, Greece, Italy, Portugal, Spain and USA.

In Australia, indoxacarb is registered for application to peppers at 0.075 kg ai/ha with harvest permitted 3 days after the final application. In three trials on sweet peppers with conditions matching GAP, residues of indoxacarb + R enantiomer were 0.03, 0.06 and 0.41 mg/kg.

In Greece, indoxacarb may be applied to peppers in the field or in greenhouses at 0.038 kg ai/ha with harvest 1 day after the final application. In two peppers trials in the field and two in greenhouses in Greece with conditions matching GAP, residues of indoxacarb + R enantiomer were 0.03 and 0.05 mg/kg (field) and 0.06 and 0.21 mg/kg (greenhouse).

In two peppers trials in the field and three in greenhouses in France with conditions matching GAP in Greece, residues of indoxacarb + R enantiomer were < 0.02 and < 0.02 mg/kg (field) and < 0.02 (2) and 0.02 mg/kg (greenhouse).

In three peppers trials in the field in Italy with conditions matching GAP in Greece, residues of indoxacarb + R enantiomer were < 0.02, 0.045 and 0.05 mg/kg.

In one peppers trial in the field in Portugal with conditions matching GAP in Greece, residues of indoxacarb + R enantiomer were 0.035 mg/kg.

In four peppers trials in the field and four in greenhouses in Spain with conditions matching GAP in Greece, residues of indoxacarb + R enantiomer were 0.03, 0.06, 0.075 and 0.19 mg/kg (field) and 0.035, 0.04, 0.085 and 0.09 mg/kg (greenhouse).

In summary, residues in peppers from 12 field trials in Europe were < 0.02 (3), 0.03, 0.03, 0.035, 0.045, 0.05, 0.05, 0.06, 0.075 and 0.19 mg/kg, and in 9 greenhouse trials < 0.02 (2) 0.02, 0.035, 0.04, 0.06, 0.085, 0.09 and 0.21 mg/kg.

In USA, indoxacarb is registered for use on peppers at 0.073 kg ai/ha with harvest 3 days after the final application. In nine trials with both bell peppers and non-bell peppers in USA with conditions matching GAP, residues of indoxacarb + R enantiomer in rank order, median underlined, were < 0.02 (3), 0.02, 0.02, 0.04, 0.067, 0.076 and 0.096 mg/kg.

The residue data populations from the European field trials and greenhouse trials are not significantly different (Mann-Whitney test) and may be combined. The populations of the European data set and the US field trial data are not significantly different (Mann-Whitney test) and may all be combined for evaluation. A single value from three trials in Australia was higher than all the 30 values from US and Europe suggesting a different data population. Combined European and US data in rank order, median underlined: < 0.02 (8), 0.02, 0.02, 0.02, 0.03, 0.03, 0.035, 0.035, 0.04, 0.04, 0.045, 0.05, 0.05, 0.06, 0.06, 0.067, 0.075, 0.076, 0.085, 0.09, 0.096, 0.19 and 0.21 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in peppers, based on the combined data, of 0.3, 0.038 and 0.21 mg/kg respectively.

Egg plant

In USA, indoxacarb is registered for use on egg plant at 0.073 kg ai/ha with harvest 3 days after the final application, the same use pattern as on tomatoes and peppers. The Meeting decided to extrapolate the tomato recommendations to egg plant.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in egg plant of 0.5, 0.11 and 0.30 mg/kg respectively.

Sweet corn

The Meeting received information on supervised residue trials on sweet corn in USA.

Indoxacarb is registered for use on sweet corn in the USA with an application rate of 0.073 kg ai/ha and harvest 3 days after the final application. In six sweet corn trials in USA in line with GAP, residues of indoxacarb + R enantiomer in kernel + cob with husk removed were below LOQ (0.01 mg/kg). The six trials are supported with data from 12 US trials with racemic indoxacarb. In 12 sweet corn trials with racemic indoxacarb, which is expected to give higher residues than the 3S+1R indoxacarb, residues were below LOQ (0.01 mg/kg) in 11 trials and close to LOQ in the remaining one (0.012 mg/kg).

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in sweet corn (corn-on-the-cob) of 0.02, 0.01 and 0.012 mg/kg respectively.

Lettuce

The Meeting received information on supervised residue trials on lettuce in France, Greece, Italy, Spain and USA.

In Spain, indoxacarb may be applied to lettuce in field or greenhouse at 0.038 kg ai/ha with harvest permitted 1 day after the final application. In four field trials in Spain in line with GAP, residues of indoxacarb + R enantiomer in the head lettuce were 0.19, 0.25, 0.39 and 0.52 mg/kg.

In two field trials on head lettuce in Italy under conditions in line with Spanish GAP, residues of indoxacarb + R enantiomer were 0.16 and 0.88 mg/kg.

In three field trials on lettuce in France with conditions matching Spanish GAP, residues of indoxacarb + R enantiomer were 0.54 mg/kg for head lettuce and 0.52 and 0.86 mg/kg for leaf lettuce.

In a field trial on lettuce in Greece with conditions matching GAP (same as for Spain), residues of indoxacarb + R enantiomer were 1.65 mg/kg for leaf lettuce.

In summary, the residues on head lettuce from the European trials were 0.16, 0.19, 0.25, 0.39, 0.52, 0.54 and 0.88 mg/kg, while the residues on leaf lettuce were 0.52, 0.86 and 1.65 mg/kg.

In USA, indoxacarb is registered for application to lettuce at 0.12 kg ai/ha with harvest 3 days after the final application. In nine field trials with head lettuce where conditions matched GAP conditions, residues of indoxacarb + R enantiomer were in rank order, median underlined, 0.61, 2.1, 2.5, 2.7, 2.8, 3.2, 3.8, 4.0 and 4.3 mg/kg and for nine field trials on leaf lettuce, residues were 2.8, 3.6, 4.1, 6.1, 6.6, 7.2, 7.4, 8.2 and 8.4 mg/kg.

The US and European residue data populations for head lettuce were significantly different (Mann-Whitney test) and should not be combined. The same conclusion was reached for the leaf lettuce.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in head lettuce, based on the US data, of 7, 2.8 and 4.3 mg/kg respectively.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in leaf lettuce, based on the US data, of 15, 6.6 and 8.4 mg/kg respectively.

Pulses – adzuki beans, chickpeas and mungbeans

The Meeting received information on supervised residue trials on adzuki beans, chickpeas, mungbeans and soybeans from Australia. The adzuki bean data could not be evaluated because there is no registered indoxacarb use on adzuki beans.

In Australia, indoxacarb is registered for a single application to chickpeas at 0.045 kg ai/ha 28 days before harvest. In four chickpea trials in Australia with conditions matching GAP, residues of indoxacarb + R enantiomer in the chickpea grain were < 0.01, 0.02, 0.02 and 0.13 mg/kg.

In Australia, indoxacarb is registered for a single application to mungbeans at 0.060 kg ai/ha 28 days before harvest. In three mungbean trials in Australia with conditions matching GAP, residues of indoxacarb + R enantiomer in the mungbean grain were < 0.01 (2) and 0.02 mg/kg.

The Meeting combined the data from the three pulse crops for mutual support. Residues in the seven trials in rank order, median underlined, were: < 0.01 (3), 0.02 (3) and 0.13 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for indoxacarb in chickpeas and mungbeans, based on the Australian data, of 0.2 and 0.02 mg/kg respectively.

Soybeans

The Meeting received information on supervised residue trials on soybeans from USA and Australia.

In Australia, indoxacarb is registered for a single application to soybeans at 0.060 kg ai/ha 28 days before harvest. In three soybean trials in Australia with conditions matching GAP, residues of indoxacarb + R enantiomer in the soybean grain were < 0.01 (2) and 0.06 mg/kg.

In USA, indoxacarb is registered for use on soybeans at an application rate of 0.12 kg ai/ha with harvest 21 days after the final application. In 20 supervised trials in USA with a use pattern matching GAP, residues of indoxacarb + R enantiomer in rank order, with median underlined, were: 0.008, 0.009, 0.010, 0.010, 0.010, 0.011, 0.012, 0.014, 0.020, 0.024, 0.030, 0.032, 0.032, 0.039, 0.17, 0.24, 0.25, 0.29, 0.29 and 0.45 mg/kg.

The Australian data appear to be a different population from the US data. The Meeting estimated a maximum residue level and an STMR value for indoxacarb in soybeans, based on the US data, of 0.5 and 0.027 mg/kg respectively.

Potato

The Meeting received information on supervised residue trials on potatoes from USA.

In USA, indoxacarb is registered for use on potatoes at an application rate of 0.12 kg ai/ha with harvest 7 days after the final application. In 17 potato trials in USA with application rates of 0.15 kg ai/ha (25% above label rate) and PHI of 7 days, residues of indoxacarb + R enantiomer in rank order, median underlined, were: < 0.01 (17) mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in potatoes of 0.02, 0.01 and 0.01 mg/kg respectively. Residue levels exceeded the detection limit (0.003 mg/kg) in some trials, so it is not a nil residue situation. Regulatory analytical methods for indoxacarb may not be practical for the low concentrations measured in the trials. The estimated maximum residue level of 0.02 mg/kg is based on the capabilities of the reviewed analytical methods.

Peanuts

The Meeting received information on supervised residue trials on peanuts from USA.

In the USA, indoxacarb may be used on peanuts at 0.12 kg ai/ha with harvest 14 days after the final treatment. In 13 peanut trials in USA with conditions matching GAP, residues of indoxacarb + R enantiomer in peanut kernels were below LOQ (0.01 mg/kg) in every sample tested. Residue levels did not exceed the detection limit (0.003 mg/kg) in any trial. It should be noted that the PHI for peanuts is the interval between final treatment and digging, in this case 14 days. In the trials, peanuts were dug and allowed to dry in the field for 3 to 13 days before sampling.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in peanuts of 0.02*, 0.01 and 0.01 mg/kg respectively. Regulatory analytical methods for indoxacarb may not be practical for the low concentrations measured in the trials. The estimated maximum residue level of 0.02 mg/kg is based on the capabilities of the reviewed analytical methods.

Cotton

The Meeting received information on supervised residue trials on cotton from USA.

In the USA, indoxacarb is registered for use on cotton at 0.12 kg ai/ha with harvest permitted 14 days after the final application. In seven cotton trials in USA with application rates of 0.15 kg ai/ha (25% above label rate) and PHI of 13–17 days (with intervals after treatment longer than PHI when residues were greater), residues of indoxacarb + R enantiomer in cotton seed in rank order, median underlined, were: 0.067, 0.26, 0.27, 0.36, 0.37, 0.65 and 0.92 mg/kg.

The Meeting estimated a maximum residue level and STMR and HR values for indoxacarb in cotton seed of 1, 0.36 and 0.92 mg/kg respectively.

Legume animal feeds – chickpea, mungbean and soybean fodder

The Meeting received information on residues in legume fodder from the supervised residue trials in Australia.

In Australia, the indoxacarb label instruction for fodder of chickpeas, mungbeans and soybeans is: Do not graze or cut for stock food for 28 days after application. See previous section on pulses for GAP in Australia.

In four trials in Australia in line with GAP, residues of indoxacarb + R enantiomer in "chickpea trash" were: 0.78, 0.78, 1.1 and 1.2 mg/kg. In three trials in line with Australian GAP, residues in "mungbean trash" were: 1.3, 1.7 and 5.6 mg/kg. In 3 trials in line with Australian GAP, residues in "soybean trash" were: 0.07, 0.11 and 0.20 mg/kg.

The fodder data from the three crops appear not to be of the same population and so cannot be combined. The number of trials for each crop on its own is insufficient to recommend a fodder MRL.

Peanut hay

The Meeting received information on residues in peanut hay from the supervised residue trials in USA.

See previous section on peanuts for GAP in USA. In 12 peanut trials in USA matching the conditions of GAP, residues of indoxacarb + R enantiomer in peanut hay in rank order, median underlined, were: 2.1, 2.5, 8.9, 9.7, 11, 11, 12, 13, 15, 18, 21 and 33 mg/kg. Moisture levels were measured on 13 samples of peanut hay (mean = 28%, range = 19-36%). Residues in peanut hay expressed on dry weight (i.e. adjusted for 28% moisture) were: 2.9, 3.5, 12, 13, 15, 15, 17, 18, 21, 25, 29 and 45 mg/kg.

The Meeting estimated a maximum residue level and STMR and highest residue values for indoxacarb in peanut fodder (= hay) of 50, 16 and 45 mg/kg respectively.

Alfalfa

The Meeting received information on residues in alfalfa from supervised residue trials in USA.

In USA, indoxacarb is registered for use on alfalfa at 0.12 kg ai/ha, once per cutting, with cutting permitted 7 days after application. In 12 trials on alfalfa with conditions matching GAP, residues were measured in each trial after each of 3 or 4 cuttings. From each cutting, the 7 days residue (or later if it was higher) was chosen for evaluation. Residues of indoxacarb + R enantiomer in the alfalfa forage (fresh weight) from the 43 cuttings were: 0.94, 1.5, 1.6, 1.8, 1.9, 2.1, 2.2, 2.4, 2.4, 2.5, 2.5, 2.7, 2.9, 2.9, 3.1, 3.1, 3.1, 3.2, 3.3, 3.3, 3.4, 3.4, 3.8, 3.8, 3.9, 3.9, 3.9, 4, 4.2, 4.4, 4.4, 4.5, 4.8, 5.3, 5.3, 5.6, 5.7, 6, 6.2, 6.6, 7, 7.5 and 9.7 mg/kg. Residues expressed as dry weight in rank order, median underlined, were: 4.7, 6.0, 8.0, 9.4, 9.6, 10, 10, 11, 11, 12, 12, 13, 13, 13, 14, 15, 15, 15, 16, 16, 16, 16, 16, 17, 17, 17, 18, 18, 18, 18, 19, 19, 20, 21, 22, 22, 23, 24, 24, 26, 26, 27 and 28 mg/kg.

Residues of indoxacarb + R enantiomer in the alfalfa hay (fresh weight) from the 43 cuttings were: 2.4, 5.8, 6.1, 6.3, 6.7, 6.8, 7, 7.5, 7.7, 7.7, 8.2, 8.2, 8.2, 8.6, 9.1, 9.2, 9.2, 10, 10, 10, 10, 11, 12, 15, 15, 15, 16, 16, 16, 16, 17, 18, 18, 19, 20, 20, 20, 21, 23, 24, 25, 26 and 26 mg/kg. Residues expressed as dry weight in rank order, median underlined, were: 7.3, 7.5, 9.1, 10, 10, 11, 12, 12, 12, 12, 13, 13, 13, 14, 14, 14, 15, 15, 15, 16, 16, 17, 18, 19, 19, 20, 20, 20, 21, 23, 24, 25, 25, 25, 25, 26, 27, 31, 32, 33, 33, 33 and 43 mg/kg.

The Meeting estimated an STMR and a highest residue value for indoxacarb in alfalfa forage of 16 and 28 mg/kg respectively.

The Meeting estimated a maximum residue level and STMR and highest residue values for indoxacarb in alfalfa fodder (= hay) of 60, 18 and 43 mg/kg respectively.

Maize fodder

The Meeting received information on residues in sweet corn fodder (= maize fodder) from the supervised residue trials in USA.

See previous section on sweet corn for GAP in USA. The PHI for fodder and stover is 35 days. In five sweet corn trials in the USA with application rates matching GAP, residue data on stover (mature dried stalks from which the grain or whole ear (cob + grain) have been removed) were accepted with PHIs of 28–66 days. Residues, expressed as fresh weight, of indoxacarb + R enantiomer in maize fodder were: 1.6, 1.9, 3.7, 5.3 and 9.8 mg/kg.

Moisture levels were measured on six samples of stover (3 of the 6 were in the GAP trials), giving a range and mean of 23–68% and 43% dry matter respectively. Residue levels were adjusted to dry weight in maize fodder using the measured dry matter for the 3 samples directly and the average dry matter for the other two. Residue levels in maize fodder, expressed as dry weight, in rank order, median underlined, were: 4.4, 4.8, 7.8, 8.6, and 15 mg/kg.

A set of five trials is rather a limited data set to support an MRL. However, the Meeting decided that it was best to take into account the residues occurring in the fodder from sweet corn when assessing farm animal dietary burden and therefore estimated a maximum residue level for maize fodder.

The Meeting estimated a maximum residue level and STMR and highest residue values for indoxacarb in maize fodder of 25, 7.8 and 15 mg/kg respectively.

Cotton fodder

The Meeting received information on residues in cotton gin trash (= cotton fodder) from the supervised residue trials in USA.

See previous section on cotton for GAP in USA. In seven trials on cotton in USA with an indoxacarb application rate of 0.15 kg ai/ha (25% above label rate) with harvest 13–17 days after the final application, residues of indoxacarb + R enantiomer in cotton gin trash in rank order, median underlined, were: 3.6, 6.6, 6.7, 8.0, 8.4, 8.4 and 11 mg/kg.

Moisture levels were measured on several samples of cotton gin trash from these and associated trials, giving a range and mean of 77–96% and 91% dry matter (n = 9) respectively. Because moisture levels were low (average < 10%) no adjustment was made for dry matter content.

The Meeting estimated a maximum residue level and STMR and highest residue values for indoxacarb in cotton fodder of 20, 8.0 and 11 mg/kg respectively.

Fate of residues during processing

Information on the fate of indoxacarb residues during food processing was available for apples, peaches, grapes, tomatoes, potatoes and soybeans. Processing factors for potato products could not be estimated because residues in the raw agricultural commodity were less than the LOQ.

Racemic indoxacarb was generally stable to hydrolysis under pasteurisation conditions. Approximately 7–30% was lost during baking and boiling conditions. The products of hydrolysis were minor and polar.

Racemic indoxacarb was used in some of the processing studies. It is quite suitable for processing studies because it is the relative residue levels that are important.

Table 55. Calculated processing factors and the mean or best estimate are summarized in the following table.

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors.	Median or best estimate
Apples	Wet pomace	2.1, 2.6, 2.4, 2.6, 1.6, 3.6, 3.3	2.6
	Apple Juice	< 0.02, < 0.01, < 0.02, < 0.3, 0.14, < 0.3, < 0.2	0.05 Note
	Apple Sauce	< 0.3, < 0.14, < 0.3, < 0.2	0.2
Peach	Peach juice	< 0.08, < 0.11, < 0.20	0.08
	Canned peaches	< 0.08, < 0.11, < 0.20	0.08
Grapes	Raisins	2.7, 1.9, 3.5	2.7
	Grape juice	0.007	0.007
	Wine	0.037, 0.08, < 0.1, < 0.1, < 0.07	0.06
Tomatoes	Tomato puree	0.91, 0.23, 0.75, 2.0	0.83
	Tomato paste	3.2, 0.62	1.9
	Tomato juice	< 0.2, < 0.6	0.2
Undelinted cotton seed	Cotton seed hulls	0.026	0.026
	Cotton seed meal	0.0014	0.0014
	Cotton seed refined oil	0.036	0.036
Peanut kernels	Peanut oil	1	1
	Peanut meal	0.39	0.39
Soybean grain	Soybean hulls	8.5	8.5
	Soybean meal	< 0.14	0.14
	Soybean refined oil	0.66	0.66

Note: Mean of 0.14, and the 3 smaller "less-than" values.

The processing factors for wet apple pomace (2.6), apple juice (0.05) and apple sauce (0.2) were applied to the estimated STMR for apples (0.21 mg/kg) to produce STMR-P values for wet apple pomace (0.55 mg/kg), apple juice (0.011 mg/kg) and apple sauce (0.042 mg/kg).

The processing factors for peach juice (0.08) and canned peaches (0.08) were applied to the estimated STMR for peaches (0.11 mg/kg) to produce STMR-P values for peach juice (0.009 mg/kg) and canned peaches (0.009 mg/kg).

The processing factors for raisins (2.7), grape juice (0.007) and wine (0.06) were applied to the estimated STMR for grapes (0.30 mg/kg) to produce STMR-P values for raisins (0.81 mg/kg), grape juice (0.002 mg/kg) and wine (0.018 mg/kg). The processing factor for raisins (2.7) was applied to the HR for grapes (1.5 mg/kg) to produce an HR-P value for raisins (4.1 mg/kg).

The Meeting estimated a maximum residue level for indoxacarb in dried grapes (= currants, raisins, sultanas) of 5 mg/kg.

The processing factors for tomato puree (0.83), tomato paste (1.9) and tomato juice (0.2) were applied to the estimated STMR for tomatoes (0.11 mg/kg) to produce STMR-P values for tomato puree (0.09 mg/kg), tomato paste (0.21 mg/kg) and tomato juice (0.022 mg/kg).

The processing factors for cotton seed hulls (0.026), cotton seed meal (0.0014) and cotton seed refined oil (0.036) were applied to the estimated STMR for cotton seed (0.36 mg/kg) to produce STMR-P values for cotton seed hulls (0.0094 mg/kg), cotton seed meal (0.0005 mg/kg) and cotton seed refined oil (0.013 mg/kg). The estimated residue in cotton seed oil would be less than the highest residue in cotton seed because the processing factor is 0.036.

The Meeting agreed not to recommend a residue level suitable for establishing an MRL for cotton seed oil, because the level would not exceed the value recommended for the RAC, cotton seed.

The processing factors for peanut oil (1) and peanut meal (0.39) were applied to the estimated STMR for peanuts (0.003 mg/kg) to produce STMR-P values for peanut oil (0.003 mg/kg) and peanut meal (0.0012 mg/kg). The estimated residue in peanut oil would be the same as the highest residue in peanuts because the processing factor is 1.

The Meeting agreed not to recommend a residue level suitable for establishing an MRL for peanut oil, because the level would not exceed the value recommended for the RAC, peanuts.

The processing factors for soybean hulls (8.5), soybean meal (0.14) and soybean refined oil (0.66) were applied to the estimated STMR for soybean (0.027 mg/kg) to produce STMR-P values for soybean hulls (0.23 mg/kg), soybean meal (0.0038 mg/kg) and soybean refined oil (0.018 mg/kg). The estimated residue in soybean oil would be less than the highest residue in soybean because the processing factor is 0.66.

The Meeting agreed not to recommend a residue level suitable for establishing an MRL for soybean oil, because the level would not exceed the value recommended for the RAC, soybean.

Residues in animal commodities

Farm animal feeding

The meeting received a lactating dairy cow feeding study, which provided information on likely residues resulting in animal tissues and milk from residues in the animal diet.

Lactating Holstein cows were dosed with indoxacarb 3S+1R at the equivalent of 7.5 (low dose), 22.5 (medium dose) and 75 (high dose) ppm in the dry-weight diet for 28 consecutive days. Milk was collected throughout and tissues were collected for residue analysis (as indoxacarb + R enantiomer) and as metabolite IN-JT333 from animals slaughtered on day 29.

Residues in milk reached a plateau within about 4 days and levels of residue were approximately proportional to the dose. Highest residues in the milk at the 3 dosing levels were: 0.021 mg/kg (low dose), 0.054 mg/kg (medium dose) and 0.19 mg/kg (high dose). Highest residues in cream were: 0.22 mg/kg (low dose), 0.60 mg/kg (medium dose) and 2.2 mg/kg (high dose).

Metabolite IN-JT333 was below LOQ (< 0.01 mg/kg) for almost all the milk samples, but was present in cream from the 3 dosing levels on day 28 at 0.018 (low dose), 0.027 (medium dose) and 0.075 (high dose) mg/kg, representing about 3–8% of the parent compound concentration.

Indoxacarb is fat-soluble. The residue concentration in cream was found to be 10.8 times the residue in the milk (regression line for 40 data points).

In the tissues, the mean residues (indoxacarb + R enantiomer) at the 3 dosing levels were: muscle (< 0.01, < 0.01, 0.066 mg/kg); fat (0.22, 0.45, 1.9 mg/kg); liver (< 0.01, 0.01, 0.018 mg/kg); kidney (< 0.01, 0.017, 0.039 mg/kg).

Metabolite IN-JT333 was below LOQ (< 0.01 mg/kg) in muscle, kidney and liver from all doses. Metabolite IN-JT333 was present in fat at approximately 4–7% of the parent compound concentration.

Residues depleted quickly from the milk of a high-dose animal after dosing was stopped, falling below LOQ (0.01 mg/kg) after 5 days. Residues depleted to 0.079 mg/kg in the fat of the animal subjected to a 75 ppm dose for 28 days and then no dose for 15 days, i.e. depletion by approximately 96% from the value at day 28.

Farm animal dietary burden

The Meeting estimated the dietary burden of indoxacarb in farm animals on the basis of the diets listed in Appendix IX of the *FAO Manual*. Calculation from highest residue and STMR-P values provides the levels in feed suitable for estimating MRLs, while calculation from STMR and STMR-P values for feed is suitable for estimating STMR values for animal commodities. The percentage dry matter is taken as 100% when the highest residue levels and STMRs are already expressed as dry weight.

Table 56. Estimated maximum dietary burden of farm animals

Commodity	CC	Residue mg/kg	Basis	DM %	Residue dw mg/kg	*Diet content (%)*			Residue contribution (mg/kg)		
						Beef cattle	*Dairy cows*	*Poultry*	Beef cattle	Dairy cows	Poultry
Alfalfa fodder	AL	43	highest residue	100	43	*45*	*10*		19.4	4.3	
Alfalfa forage	AL	28	highest residue	100	28						
Apple pomace, wet	AB	0.55	STMR-P	40	1.38		*5*			0.07	
Chick-pea (dry)	VD	0.13	highest residue	100	0.13						
Cotton fodder, dry	AM	11	highest residue	90	12.2	*5*	*20*		0.61	2.4	
Cotton seed	SO	0.92	highest residue	88	1.05						
Cotton seed hulls	AM	0.0094	STMR-P	90	0.0104						
Cotton seed meal		0.0005	STMR-P	89	0.0006			*15*			0.00008
Maize fodder	AS	15	highest residue	100	15	*25*	*15*		3.8	2.3	
Peanut fodder	AL	45	highest residue	100	45	*25*	*50*		11.3	22.5	
Peanut meal		0.0012	STMR-P	85	0.0014			*25*			0.00035
Potato culls	VR	0.0085	highest residue	20	0.043						
Soya bean (dry)	VD	0.45	highest residue	89	0.51			*20*			0.101
Soybean hulls	AL	0.23	STMR-P	90	0.26			*20*			0.051
Soybean meal	AL	0.0038	STMR-P	92	0.0041			*20*			0.00083
Total						*100*	*100*	*100*	35.0	31.6	0.15

Table 57. Estimated mean dietary burden of farm animals

Commodity	CC	Residue mg/kg	Basis	DM %	Residue dw mg/kg	*Diet content (%)*			Residue contribution (mg/kg)		
						Beef cattle	*Dairy cows*	*Poultry*	Beef cattle	Dairy cows	Poultry
Alfalfa fodder	AL	25.5	STMR	100	25.5	*70*	*60*		17.9	15.3	
Alfalfa forage	AL	22.5	STMR	100	22.5						
Apple pomace, wet	AB	0.55	STMR-P	40	1.38		*5*			0.07	
Chick-pea (dry)	VD	0.015	STMR	100	0.015						
Cotton fodder, dry	AM	8	STMR	90	8.89	*20*	*20*		1.78	1.8	
Cotton seed	SO	0.36	STMR	88	0.41						
Cotton seed hulls	AM	0.0094	STMR-P	90	0.0104						
Cotton seed meal		0.0005	STMR-P	89	0.0006			*15*			0.00008
Maize fodder	AS	7.8	STMR	100	7.80	*10*	*15*		0.8	1.2	
Peanut fodder	AL	16	STMR	100	16						
Peanut meal		0.0012	STMR-P	85	0.0014			*25*			0.00035
Potato culls	VR	0.003	STMR	20	0.015						
Soya bean (dry)	VD	0.027	STMR	89	0.03			*20*			0.006
Soybean hulls	AL	0.23	STMR-P	90	0.26			*20*			0.051
Soybean meal	AL	0.0038	STMR-P	92	0.0041			*20*			0.00083
Total						*100*	*100*	*100*	20.4	18.3	0.06

Animal commodities, MRL estimation

For MRL estimation, the high residues in the tissues were calculated by interpolating the maximum dietary burden between the relevant feeding levels from the dairy cow feeding study and using the highest tissue concentrations from individual animals within those feeding groups. The high residues for milk and cream were calculated similarly except that the mean milk and cream concentrations from the relevant groups were used instead of the highest individual values.

The STMR values for the tissues, milk and cream were calculated by interpolating the STMR dietary burdens between the relevant feeding levels from the dairy cow feeding study and using the mean tissue and milk concentrations from those feeding groups. The concentrations of Metabolite IN-JT333 in the tissues, milk and cream were expressed as indoxacarb and added to the concentrations of indoxacarb and its enantiomer, which caused a slight change in concentrations in cream and fat, but not in milk or the other tissues.

In Table 58, dietary burdens are shown in round brackets (), feeding levels and residue concentrations from the feeding study are shown in square brackets [] and estimated concentrations related to the dietary burdens are shown without brackets. Residue concentrations from the feeding study and estimated concentrations related to the dietary burdens include Metabolite IN-JT1333.

Table 58. Residue concentrations from the feeding study and estimated concentrations related to the dietary burdens.

Dietary burden (ppm) Feeding level [ppm]	Milk	Cream	Cream	Muscle	Liver	Kidney	Fat	Fat
MRL			Includes IN-JT333					Includes IN-JT333
	mean	mean	mean	highest	highest	highest	highest	highest
MRL beef cattle (35.0) [22.5, 75]				0.03 [<.01, 0.093]	0.014 [0.013, 0.019]	0.027 [0.020, 0.049]	0.86 [0.54, 1.9]	0.91 [0.57, 2.0]
MRL dairy cattle (31.6) [22.5, 75]	0.081 [0.058, 0.19]	0.88 [0.60, 2.2]	0.91 [0.62, 2.3]					
STMR								
	mean	mean	mean	mean	mean	mean	mean	mean
STMR beef cattle (20.4) [7.5, 22.5]				< 0.01 [< 0.01, < 0.01]	0.01 [< 0.01, 0.01]	0.016 [< 0.01, 0.017]	0.42 [0.22, 0.45]	0.44 [0.22, 0.48]
STMR dairy cattle (18.3) [7.5, 22.5]	0.048 [0.021, 0.058]	0.49 [0.21, 0.60]	0.51 [0.21, 0.62]					

The Meeting estimated dietary burdens for indoxacarb + R enantiomer in dairy cows to be 31.6 and 18.3 ppm (maximum and mean). By interpolation, the highest residue and STMR for milk were estimated as 0.081 and 0.048 mg/kg. Similarly, the STMR for cream was estimated 0.51 mg/kg. On the assumption of 50% milk fat in cream, these values become 1.82 and 1.02 mg/kg for milk fat. The highest residue for parent compound only in cream was 0.88 mg/kg, i.e. 1.76 mg/kg in milk fat.

The Meeting estimated a maximum residue level and an STMR value for indoxacarb in milk of 0.1 and 0.048 mg/kg, respectively.

The Meeting estimated a maximum residue level and an STMR value for indoxacarb in milk fat of 2 and 1.0 mg/kg, respectively.

The Meeting estimated dietary burdens for indoxacarb + R enantiomer in beef cattle to be 35.0 and 20.4 ppm (maximum and mean). By interpolation, the highest residues for muscle, liver, kidney and fat were estimated as 0.03, 0.014, 0.027 and 0.91 respectively, with corresponding STMR values of < 0.01, 0.01, 0.016 and 0.44 mg/kg. The highest residue of parent only in fat was 0.86 mg/kg.

The Meeting estimated maximum residue levels of 1 (fat) and 0.05 mg/kg for indoxacarb in mammalian meat and edible offal respectively.

The Meeting estimated STMR values for indoxacarb in muscle tissue, mammalian fat and edible offal of 0.01, 0.44 and 0.016 respectively, with corresponding HR values of 0.03, 0.91 and 0.027 mg/kg, respectively.

The Meeting estimated dietary burdens for indoxacarb + R enantiomer in poultry to be 0.15 and 0.006 ppm (maximum and mean). The dosing level in the laying hen metabolism study was equivalent to 10 ppm in feed. Indoxacarb (+ R enantiomer) was not a major component of the identified residue in poultry commodities so estimates were made of both the total 14C residue and the indoxacarb residue resulting from exposure to the dietary burden feed levels. Calculations were made on the assumption that residues at the dietary burden level were proportional to residues in the laying hen metabolism study, based on relative intakes.

For a dietary burden of 0.15 ppm, estimated equivalent total residues were calculated as 0.0073, 0.0005, 0.0035, 0.0020 and 0.0048 mg/kg in fat, muscle, skin + fat, liver and eggs (yolk) respectively. Estimated residues of indoxacarb + R enantiomer were: 0.0004, < 0.0002, 0.0005, 0.0002 and 0.0002 mg/kg in fat, muscle, skin + fat, liver and eggs (yolk) respectively. All of these values are below the LOQ of the analytical method (0.01 mg/kg).

The Meeting recommended maximum residue levels of 0.01*(fat), 0.01* and 0.01* for indoxacarb in poultry meat, poultry offal and eggs, respectively. The Meeting recommended STMR and HR values of 0 mg/kg for poultry fat, muscle, offal and eggs, respectively.

RECOMMENDATIONS

On the basis of the data from supervised trials, the Meeting concluded that the residue concentrations listed below are suitable for establishing MRLs and for assessing IEDIs and IESTIs.

Definition of the residue (for compliance with the MRL for all commodities and for estimation of dietary intake for plant commodities): *sum of indoxacarb and its R enantiomer.* The residue is fat soluble.

Definition of the residue (for estimation of dietary intake for animal commodities): *sum of indoxacarb, its R enantiomer and methyl 7-chloro-2,5-dihydro-2-[[[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4]oxadiazine-4a(3H)-carboxylate, expressed as indoxacarb.*

Table 59. Summary of recommendations.

CCN	Commodity	MRL, mg/kg	STMR or STMR-P, mg/kg	HR or HR-P, mg/kg
AL 1020	Alfalfa fodder	60		

CCN	Commodity	MRL, mg/kg	STMR or STMR-P, mg/kg	HR or HR-P, mg/kg
FP 0226	Apple	0.5	0.21	0.30
VB 0400	Broccoli	0.2	0.055	0.14
VB 0041	Cabbages, Head	3	0.435	2.7
FM 0812	Cattle milk fat	2	1.0	
VB 0404	Cauliflower	0.2	0.02	0.14
VD 0524	Chick-pea (dry)	0.2	0.02	
AM 691	Cotton fodder, dry	20		
SO 0691	Cotton seed	1	0.36	0.92
VC 0424	Cucumber	0.2	0.02	0.10
DF 0269	Dried grapes (= Currants, Raisins, Sultanas)	5	0.81	4.1
MO 0105	Edible offal (Mammalian)	0.05	0.016	0.027
VO 0440	Egg plant	0.5	0.11	0.30
PE 0112	Eggs	0.01*	0	0
FB 0269	Grapes	2	0.30	1.5
VL 0482	Lettuce, Head	7	2.8	4.3
VL 0483	Lettuce, Leaf	15	6.6	8.4
AS 0645	Maize fodder	25	7.8	15
MM 0095	Meat (from mammals other than marine mammals)	1 (fat)	0.01 muscle 0.44 fat	0.03 muscle 0.91 fat
VC 0046	Melons, except Watermelon	0.1	0.02	0.02
ML 0106	Milks	0.1 Note	0.048	
VD 0536	Mung bean (dry)	0.2	0.02	
FS 0247	Peach	0.3	0.11	0.18
AL 0697	Peanut fodder	50		
SO 0697	Peanuts	0.02*	0.01	0.01
FP 0230	Pear	0.2	0.051	0.11
VO 0051	Peppers	0.3	0.038	0.21
VR 0589	Potato	0.02	0.01	0.01
PM 0110	Poultry meat	0.01* (fat)	0 muscle 0 fat	0 muscle 0 fat
PO 0111	Poultry, Edible offal of	0.01*	0	0
VD 0541	Soya bean (dry)	0.5	0.027	
VO 0447	Sweet corn (corn-on-the-cob)	0.02	0.01	0.012
VO 0448	Tomato	0.5	0.11	0.30
	Apple juice		0.011	
	Apple pomace, wet		0.55	
	Cotton seed refined oil		0.013	
	Grape juice		0.002	
	Peach juice		0.009	
	Peaches, canned		0.009	
	Peanut oil		0.003	
	Soybean refined oil		0.018	
	Tomato juice		0.022	
	Tomato paste		0.21	
	Wine		0.018	

* At or about the limit of quantification.

Note: Indoxacarb is a fat-soluble compound. Previously, the milk MRL would have been marked with an F to indicate a procedure for calculating "MRLs" for processed dairy products. Currently, indoxacarb MRLs for milk and milk fat are available to support "MRLs" for processed dairy products.

DIETARY RISK ASSESSMENT

Long-term intake

The evaluation of indoxacarb resulted in recommendations for MRLs and STMR values for raw and processed commodities. Data on consumption were available for 37 food commodities and were used to calculate dietary intake. The results are shown in Annex 3 of the 2005 JMPR Report.

The IEDIs in the five GEMS/Food regional diets, based on estimated STMRs were 1–50 % of the maximum ADI of 0.01 mg/kg bw. The Meeting concluded that the long-term intake of residues of indoxacarb from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The IESTI of indoxacarb calculated on the basis of the recommendations made by the JMPR represented 0–130 % of the ARfD (0.1 mg/kg bw) for children and 0-50 % for the general population. The IESTI for head cabbage for children was 130% of the ARfD. The results are shown in Annex 4 of the 2005 JMPR Report.

It should be noted that unit weight data are not available for leaf lettuce in the GEMS/Food data base. Availability of a realistic unit weight would improve the estimate of short-term intake.

The Meeting concluded that the short-term intake of residues of indoxacarb resulting from uses that have been considered by the JMPR, except the use on head cabbages, is unlikely to present a public health concern.

The information provided to the JMPR precludes an estimate that the dietary intake would be below the ARfD for consumption of head cabbages by children.

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