

## THIACLOPRID (223)

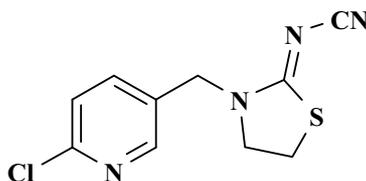
*The first draft was prepared by Mr. Christian Sieke, Federal Institute for Risk Assessment, Germany*

### EXPLANATION

Residue and analytical aspects of thiacloprid were considered for the first time by the present meeting. The manufacturer submitted studies on metabolism, analytical methods, supervised field trials, processing, freezer storage stability, environmental fate in soil and rotational crop residues.

### IDENTITY

Common name:	Thiacloprid
Chemical name:	
IUPAC:	N-{3-[(6-Chloro-3-pyridinyl)methyl]-1,3-thiazolan-2-yliden}cyanamide
CA (index):	Cyanamide, [3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene]-
Manufacturer's code number:	YRC 2894
CAS number:	111988-49-9
CIPAC number:	not allocated
Molecular formula:	C <sub>10</sub> H <sub>9</sub> ClN <sub>4</sub> S
	Structural formula:



Molecular mass: 252.73 g/mol

Formulations:

Formulation	Content of active ingredients	Trade names
SC 480	480 g/L Thiacloprid	Calypso
SC 240	240 g/L Thiacloprid	Calypso
OD 240	240 g/L Thiacloprid	Biscaya

### PHYSICAL AND CHEMICAL PROPERTIES

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

References to test materials used:

- 1 Thiacloprid (batch 941013ELB01, purity 99.3%)
- 2 Thiacloprid (batch 950614ELB02, purity 99.7%)
- 3 Thiacloprid (batch 940629ELB04, purity 98.6%)
- 4 [methylene-<sup>14</sup>C] thiacloprid, radiochemical purity > 98%, specific radioactivity 3.43 MBq/mg

Table 1. Physical and chemical data of thiacloprid.

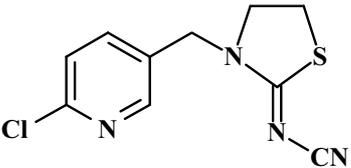
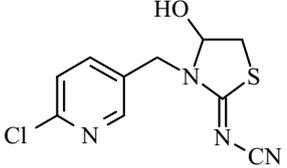
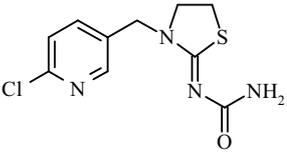
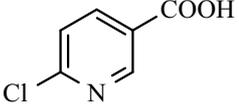
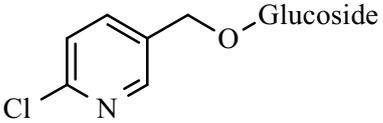
Property	Results	Test Material, Method	Reference
Physical state, colour	Active substance, pure: yellowish powder of crystals Active substance as manufactured: yellowish crystalline powder	Material 1 Technical ai	Krohn, J. 1996
Odour	Active substance, pure: no characteristic odour Active substance as manufactured: weak characteristic odour	Material 1 Technical ai	Krohn, J. 1996
Melting point	136 °C A second modification has a melting point of 128°C.	Material 1 EU A.1.	Krohn, J. 1996 Goehrt, A. 1995
Density	1.46 g/cm <sup>3</sup> at 20°C	Material 1, OECD 109	Krohn, J. 1996
Vapour pressure	1.61 · 10 <sup>-8</sup> to 4.50 · 10 <sup>-8</sup> Pa at 50°C 1.21 · 10 <sup>-7</sup> to 1.61 · 10 <sup>-7</sup> Pa at 60°C 1.68 · 10 <sup>-7</sup> to 6.31 · 10 <sup>-7</sup> Pa at 70 °C  3 · 10 <sup>-10</sup> Pa at 20 °C (extrapolated) 8 · 10 <sup>-10</sup> Pa at 25 °C (extrapolated)	Material 2, OECD 104 ≅ EU A.4	Krohn, J. 1996
Volatility	Henry's law constant at 20°C (calculated): 5 × 10 <sup>-10</sup> Pa × m <sup>3</sup> × mol <sup>-1</sup>		Krohn, J. 1996
Solubility in water	0.185 g/L at 20°C The solubility is not influenced by the pH in the range between pH 4 and pH 9.	Material 1, OECD 105 ≅ EU A.6.	Krohn, J. 1996
Solubility in organic solvents (at 20 °C, in g/L)	n-heptane < 0.1 g/L at 20°C xylene 0.30 g/L at 20°C 1-octanol 1.4 g/L at 20°C 2-propanol 3.0 g/L at 20°C ethyl acetate 9.4 g/L at 20°C polyethylen glycol (PEG) 42 g/L at 20°C acetonitrile 52 g/L at 20°C acetone 64 g/L at 20°C dichloromethane 160 g/L at 20°C dimethylsulfoxide 150 g/L at 20°C	Material 3, CIPAC MT 157, part 2	Krohn, J. 1996
Dissociation constant	Thiacloprid has no acidic or basic properties in aqueous solutions. It is not possible to specify dissociation constants of the active substance in water.	Material 1, OECD 112	Krohn, J. 1996
Partition coefficient n-octanol/ water	P <sub>OW</sub> = 18 log P <sub>OW</sub> = 1.26 at 20°C The effect of pH (4-9) was not investigated because there is no influence of pH on the water solubility.	Material 1, OECD 107 ≅ EU A.8	Krohn, J. 1996
Hydrolysis rate	Thiacloprid is stable at pH 5, 7 and 9. Under the experimental conditions the test substance was recovered from solution at content levels throughout the experiment (95-98% of applied). In the pH range tested formation of hydrolysis products was only observed at pH 9 at amounts less than 2% of the applied radioactivity.  Considering the hydrolytic stability determined under environmental pH and temperature conditions it is not expected that hydrolytic processes will contribute to the degradation of thiacloprid in the environment.	Material 4, EPA 161-1	Brumhard, B. 1998

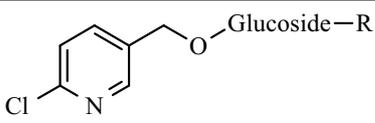
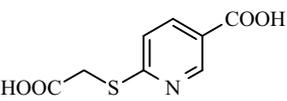
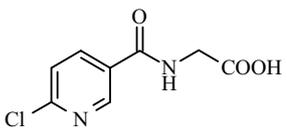
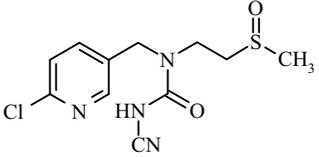
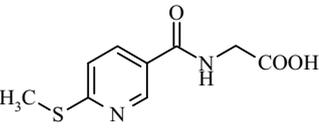
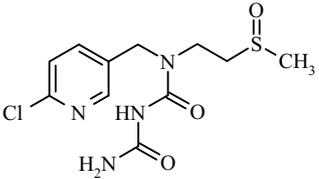
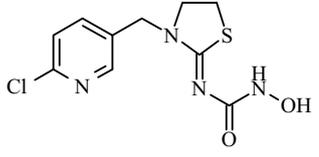
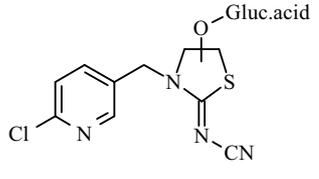
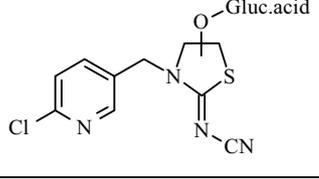
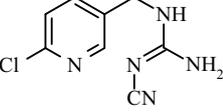
Property	Results	Test Material, Method	Reference
Photochemical degradation	<p>Under the experimental conditions used thiacloprid degraded very slowly with an experimental half life of 79.7 days. Recovery ranged from 100.8 to 107.4% of the applied radioactivity. One main photoproduct (WAK 7259 A) was observed during the course of the experiment and accounted for a maximum of about 5% of the applied radioactivity. There was no degradation observed in the dark control samples.</p> <p>Considering the slow photolytic breakdown determined under environmental pH and temperature conditions it is expected that photolytic processes in aqueous solutions will contribute to the degradation of thiacloprid in the environment only to a very limited extent.</p>	Material 4, EPA 161-2	Henneböle + Bornatsch, 1998

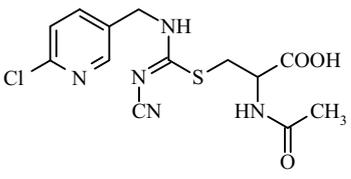
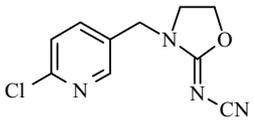
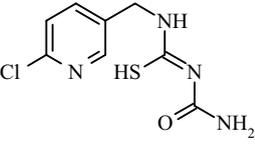
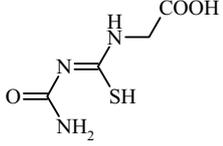
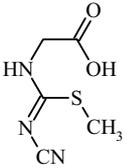
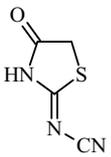
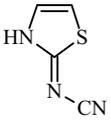
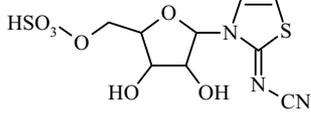
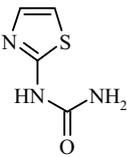
### METABOLISM AND ENVIRONMENTAL FATE

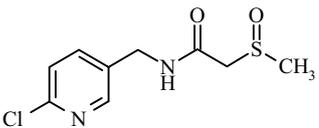
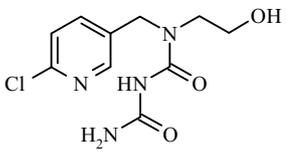
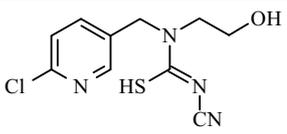
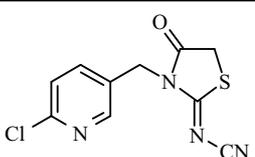
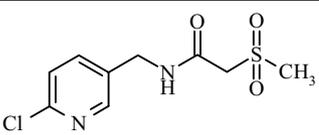
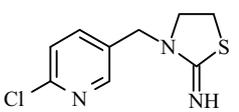
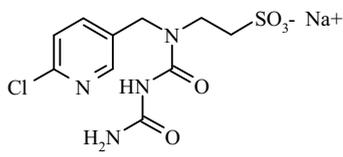
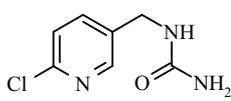
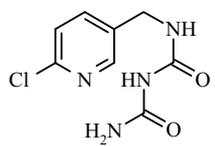
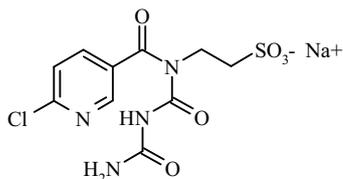
Chemical names, structures and code names of metabolites and degradation products of thiacloprid are shown below.

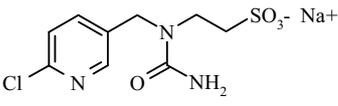
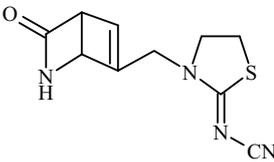
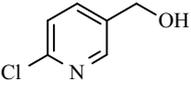
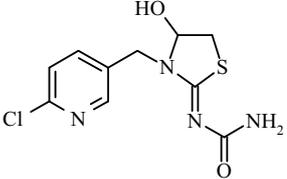
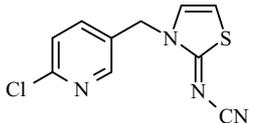
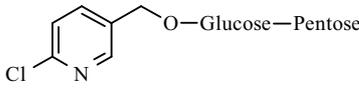
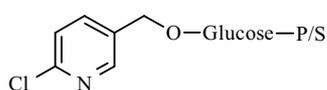
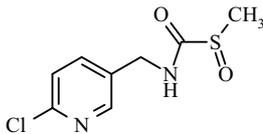
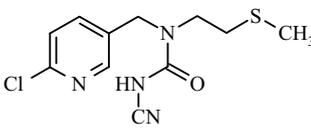
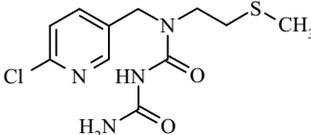
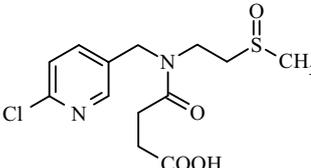
#### List of Metabolites – sorted by chemical structures

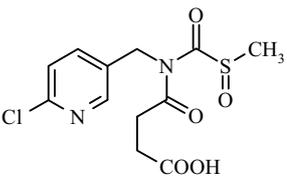
Structure	Name	Occurrence
	<p><u>AS</u>, Thiacloprid YRC 2894, PIZ 1264, ECW 10874, THS 4432, Ja752-J <i>{3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene}cyanamide</i></p>	<p>Apple, tomato, cotton Goat, hen, rat Soil</p>
	<p><u>M01</u> 4-hydroxy-thiacloprid, WAK 6856, PIZ 1265, KNO 1863, FHW 0106E, G1 <i>{3-[(6-chloro-3-pyridinyl)methyl]-4-hydroxy-2-thiazolidinylidene}cyanamide</i></p>	<p>Apple, tomato, cotton Goat, hen, rat</p>
	<p><u>M02</u> thiacloprid-amide, KKO 2254, Ja752-A, FHW 0104D <i>{3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene}urea</i></p>	<p>Apple, cotton Soil Rotational crops Soil (by photolysis)</p>
	<p><u>M03</u> 6-CNA, BNF5518A, Ja752-K, G6 <i>6-chloro-3-pyridinecarboxylic acid</i></p>	<p>Tomato, cotton Goat, hen, rat Soil Rotational crops</p>
	<p><u>M04</u> 6-CPA-glucoside, G4 <i>Glucoside of 6-chloro-3-pyridine-methanol</i></p>	<p>Tomato, cotton</p>

Structure	Name	Occurrence
	<u>M05</u> 6-CPA-complex glucoside <i>Complex glucoside of 6-chloro-3-pyridine-methanol</i>	Tomato
	<u>M06</u> 6-CMT-nicotinic acid <i>6-[(carboxymethyl)thio]-3-pyridine-carboxylic acid</i>	Rat
	<u>M07</u> 6-CN-glycine, WAK 3583 <i>N-[(6-chloro-3-pyridinyl)-carbonyl]glycine</i>	Goat, hen, rat
	<u>M08</u> 6-CP-urea sulfoxide, KNO 2672 <i>N-[(6-chloro-3-pyridinyl)methyl]-N'-cyano-N-[2-(methylsulfinyl)ethyl]urea</i>	Goat, hen, rat
	<u>M09</u> KNO 1889 <i>N-[[6-(methylthio)-3-pyridinyl]-carbonyl]glycine</i>	Hen, rat
	<u>M10</u> 6-CP-biuret sulfoxide, KNO 1891, KNO 1873B <i>N-[(6-chloro-3-pyridinyl)methyl]-N-N-[2-(methylsulfinyl)ethyl]iminodi carbonic diamide</i>	Goat, hen, rat
	<u>M11</u> thiacloprid-hydroxylamide, KNO 1893 <i>N-{3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene}-N'-hydroxyurea</i>	Goat, hen, rat
	<u>M12</u> KNO 2621, PIZ 1270 Glucuronic acid conjugate of {3-[(6-chloro-3-pyridinyl)methyl]-4(or 5)-hydroxy-2-thiazolidinylidene}=cyanamide	Goat, rat
	<u>M13</u> KNO 2665, PIZ 1271 <i>Glucuronic acid conjugate of {3-[(6-chloro-3-pyridinyl)methyl]-5(or 4)-hydroxy-2-thiazolidinylidene}=cyanamide</i>	Goat, rat
	<u>M14</u> 6-CP-cyanoguanidine, KNO 1872 <i>N-[(6-chloro-3-pyridinyl)methyl]-N'-cyanoguanidine</i>	Hen, rat

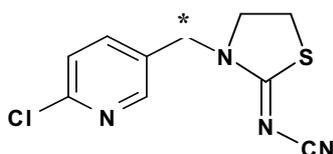
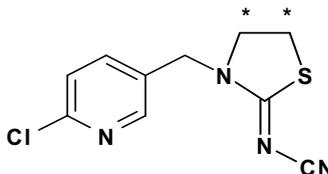
Structure	Name	Occurrence
	<u>M15</u> S-(6-CP-cyanoamidino)-acetylcystein, KNO 2684 N-acetyl-3- {[N-[(6-chloro-3-pyridinyl) methyl]-N'-cyano]amidinothio} alanine	Goat, hen, rat
	<u>M16</u> thiacloprid O-analogue, NTN 35078, PIZ 1266, KNO 1859 {3-[(6-chloro-3-pyridinyl)methyl]-2-oxazolidinylidene}cyanamid	Goat, hen, rat
	<u>M17</u> 6-CP-thiobiuret, KNO 1864 1-[(6-chloro-3-pyridinyl)methyl]-2-thiobiuret	Goat rat
	<u>M18</u> 1-CM-2-thiobiuret, PIZ 1241C N- {[ (aminocarbonyl) amino] = thioxomethyl} glycine	Rat
	<u>M19</u> PIZ 1252, PIZ 1250 N-[cyanimino(methylthio)methyl]= glycine	Rat
	<u>M20</u> PIZ 1297B (4-oxo-2-thiazolidinylidene)= cyanamide	Rat
	<u>M21</u> PIZ 1245 2-thiazolylcyanamide	Rat
	<u>M22</u> PIZ 1243, PIZ 1244 [3-(5-O-sulfono-furanosyl)-2-thiazolyl]cyanamide	Rat
	<u>M23</u> PIZ 1249 2-thiazolylurea	Rat

Structure	Name	Occurrence
	<u>M24</u> PIZ 1297E N-[(6-chloro-3-pyridinyl)methyl]-2-(methylsulfinyl)acetamide	Rat
	<u>M25</u> WAK 6935, PIZ 1297F N-[(6-chloro-3-pyridinyl)methyl]-N-(2-hydroxyethyl)imidodicarbonic diamide	Rat
	<u>M26</u> PIZ 1253 N-[(6-chloro-3-pyridinyl)methyl]-N'-cyano-N-(2-hydroxyethyl)thiourea	Rat
	<u>M27</u> PIZ 1297D {3-[(6-chloro-3-pyridinyl)methyl]-4-oxo-2-thiazolidinylidene} cyanamide	Rat
	<u>M28</u> PIZ 1269X N-[(6-chloro-3-pyridinyl)methyl]-2-(methylsulfonyl)acetamide	Rat
	<u>M29</u> thiacloprid thiazolidinimine, KTU 3072, LZR 7497, Ja752-C, NTN 36232, WAK 7376 3-[(6-Chloro-3-pyridinyl)methyl]-2-thiazolidinimine	Soil Rotational crops
	<u>M30</u> thiacloprid sulfonic acid, sodium salt, thiacloprid sodium sulfonate, WAK 6999, Ja752-D, G9 Sodium 2-[[[(aminocarbonyl)amino]carbonyl][(6-chloro-3-pyridinyl)methyl]amino]ethanesulfonate	Soil Rotational crops
	<u>M31</u> thiacloprid urea, DIJ 10739, Ja752-H [(6-chloro-3-pyridinyl)methyl]urea	Soil Rotational crops
	<u>M32</u> thiacloprid diamide, WAK 7747, Ja752-I, De23, Z8 N-[(6-chloro-3-pyridinyl)methyl]-imidodicarbonic diamide	Soil
	<u>M33</u> thiacloprid oxo-sodium sulfonate, Ja752-B Sodium 2-[[[(aminocarbonyl)amino]carbonyl][(6-chloro-3-pyridinyl)carbonyl]amino]ethanesulfonate	Soil

Structure	Name	Occurrence
	<b>M34</b> YRC sulfonic acid amide, SAA, De24, Z1 Sodium 2-[(aminocarbonyl)[(6-chloro-3-pyridinyl)methyl]amino]ethane-sulfonate	Soil Rotational crops
	<b>M35</b> thiacloprid dewar pyridone, WAK 7259A [3-[(3-oxo-2-azabicyclo[2.2.0]hex-5-en-6-yl)methyl]-2-thiazolidinylidene]-cyanamide	Water
	<b>M36</b> 6-CPA, G2 6-chloro-3-pyridinemethanol	Cotton Rotational crops
	<b>M37</b> 4-hydroxy-KKO 2254, FHW 0104B {3-[(6-chloro-3-pyridinyl)methyl]-4-hydroxy-2-thiazolidinylidene} urea	Cotton Rotational crops
	<b>M38</b> thiacloprid-olefin, NTN 35099 {3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene} cyanamide	Cotton
	<b>M39</b> 6-CPA-glucosylpentoside, G7 Glucosylpentoside of 6-chloro-3-pyridine-methanol	Cotton
	<b>M40</b> 6-CPA-glucosylphosphate/sulfate, G10 Glucosylphosphate/sulfate of 6-chloro-3-pyridinemethanol	Cotton
	<b>M41</b> KNO 2673 N-[(6-chloro-3-pyridinyl)methyl]-(methylsulfinyl)carboxamide	Goat, hen
	<b>M42</b> ANC 1502 N-[(6-chloro-3-pyridinyl)methyl]-N'-cyano-N-[2-(methylthio)ethyl]urea	Goat
	<b>M43</b> ANC 1503 N-[(6-chloro-3-pyridinyl)methyl]-N-[2-(methylthio)ethyl]imidodi-carbonic diamide	Goat
	<b>M44</b> ANC 1508A 4-[[[(6-chloro-3-pyridinyl)methyl] [2-(methylthio)ethyl]amino] 4-oxo-butanoic acid	Goat

Structure	Name	Occurrence
	<p><u>M45</u> ANC 1508B 4- {[ (6-chloro-3-pyridinyl)methyl] [(methylsulfinyl)carbonyl]amino} -4-oxo-butanoic acid</p>	Goat

Studies of metabolism and degradation were carried out with [ $^{14}\text{C}$ ]-thiacloprid labelled in the methylene-position and in the thiazolidine-position as shown below.

[Methylene- $^{14}\text{C}$ ]-thiacloprid[Thiazolidine- $^{14}\text{C}$ ]-thiacloprid

★ = position of label

### ***Animal metabolism***

The metabolism of thiacloprid has been studied in laboratory rats, goats and hens, in compliance with GLP. Rat metabolism studies were evaluated by the WHO Core Assessment Group of the 2006 JMPR. A short summary of the rat metabolism in comparison with the goat and hen metabolism is given on the end of this section.

#### *Lactating goat*

The kinetic behaviour and the metabolism of [methylene- $^{14}\text{C}$ ]-thiacloprid were investigated in a lactating goat (Anderson, C.; Weber, H. and Bornatsch, W. 1998). A target dose of 10 mg/kg body weight was administered orally as a suspension in tragacanth to one lactating goat (34 kg bw at first dosing) on three consecutive days in time intervals of 24 hours.

Radioactivity was measured in the excreta, plasma and milk at different sampling intervals. The goat was sacrificed 6 hours after the final dosage, after which the edible tissues kidney, liver, muscle and fat were radio-assayed. Metabolites were extracted from milk and edible tissues and purified by applying chromatographic techniques (TLC and HPLC). Metabolite identification was based on co-chromatography with authentic references in two different chromatographic systems or on spectroscopic evidence (mass- and NMR-spectroscopy as well as hyphenated techniques). The quantification of the metabolites was conducted by integrating the  $^{14}\text{C}$ -signals in the chromatograms of the tissue extracts.

The radioactivity concentrations in the plasma were followed after the first administration. A broad maximum 2 hours after dosage with a peak level of 4.17  $\mu\text{g/mL}$ , corresponding to about 42% of the equidistribution concentration of 10  $\mu\text{g/mL}$  could be observed. The radioactivity was eliminated from the plasma in two phases. The initial phase was described by a half-life of about 5 hours. Thereafter, the elimination process slowed down and was governed by a half-life of about 32 hours. At this time, the concentration in plasma had decreased to 1.47  $\mu\text{g/mL}$ .

The recovery of radioactivity and the excretion behaviour of the lactating goat are presented in Table 2. The excretion amounted to about 53.7% of the total administered radioactivity until sacrifice. A portion of about 48.3% was eliminated with urine and 4.5% with faeces.

A small amount, 0.93% of the total dose, was secreted in milk. Milk was collected twice daily, just before application and again in the evening. An equivalent concentration of 2.43 µg/mL was measured in the milk 8 hours after the first dosage. The maximum concentration of 4.70 µg/mL was obtained at 32 hours.

Table 2. Percentages of the total radioactivity excreted/secreted with urine, faeces and milk.

Sample	Time after 1st dose (h)	Dose No.	% of the total dose
Urine (incl. urine funnel rinse)	0	1	--
	24	2	17.95
	48	3	30.12
	54	(sacrifice)	0.18
Subtotal			48.25
Faeces	0	1	--
	24	2	0.21
	48	3	2.90
	54	(sacrifice)	1.36
Subtotal			4.47
Milk	0	1	--
	8		0.14
	24	2	0.17
	32		0.27
	48	3	0.14
	54	(sacrifice)	0.21
Subtotal			0.93
Total excreted			53.65
Calculated/estimated residue in edible tissues			5.61
Recovery			59.25

Due to the short survival period after the last dosage, 40% of the dose was not recovered in the excreta.

At sacrifice 6 hours after the last administration, the highest equivalent concentration was measured in the kidney (24.78 mg/kg fresh weight), followed by that obtained for the liver (17.4 mg/kg). These concentrations corresponded to 0.21% and 1.25% of the total dose in the kidneys and liver, respectively. The residue concentrations of the other edible tissues are at least fourfold lower. The detailed data are shown in Table 3.

Table 3. Residue levels of thiacloprid equivalents in the edible tissues and organs of the lactating goat.

Organ	Residue levels (mg/kg)
Kidney	24.78
Liver	17.40
Muscle (flank)	4.18
Muscle (loin)	3.92
Muscle (round)	3.81
Fat (omental)	1.56
Fat (perirenal)	1.59
Fat (subcutaneous)	4.86
Milk (at sacrifice)	4.10

The radioactive residues were extracted from milk and edible tissues with high recoveries of 92 up to 99% using acetonitrile and mixtures of acetonitrile with 0.5% aqueous NaCl. In order to optimise the clean-up procedure and to provide sufficient sample material for metabolite identification, several series of extractions were conducted. After sample clean-up the extracts were analysed by HPLC for the quantitative determination of thiacloprid and its metabolites. The radioactive components were identified by co-chromatography with authentic reference compounds and by spectroscopic investigations.

More than about 96% of the TRR in fat and muscle was recovered by extraction. After sample clean-up, 94% of the TRR or more was subjected to quantitative analysis by HPLC. Unchanged thiacloprid was the pre-dominant component of the TRR accounting for at least 87% of the TRR in fat and about 90% in muscle. The corresponding concentrations were 1.6 mg/kg in fat and 3.5 mg/kg in muscle. Several metabolites were detected at levels near the LOQ. The total rate of identification was about 95% of the TRR in fat and at least 93% of that in muscle (Table 4).

In kidney about 90% or more of the TRR was recovered by extraction. Eighty nine percent of the TRR was subjected to quantitative analysis by HPLC after sample clean-up. Unchanged thiacloprid was the main component of the TRR accounting for at least 28.3% of the TRR in kidney, which corresponded to 7.0 mg/kg. The main metabolites in kidney were the glucuronides M12 and M13 as well as M08 with up to 10.7, 7.1 and 12.3% of the TRR each. A series of metabolites such as M01, M07, M10, M11, M16, M41 and M44/M45 accounted for about 2 to 5% of the TRR individually. The metabolite M15 and two peaks of unknown identity were near or below the LOQ of the TRR in kidney. The portion identified was about 81% of the TRR in kidney (Table 4).

About 94% or more of the TRR in liver was recovered by extraction. After sample clean-up at least 90% of the TRR was subjected to quantitative analysis by HPLC. Unchanged thiacloprid was the predominant component of the TRR accounting for at least 83% of the TRR in liver, corresponding to 14.4 mg/kg. Several metabolites were detected at levels near the LOQ. The total rate of identification was 88 to 92% of the TRR in liver (Table 4).

More than 92% of the TRR in milk was recovered by. For quantitative analysis by HPLC samples containing at least 87% of the TRR following sample clean-up were chosen. Unchanged thiacloprid was also the major radioactive component in milk accounting for at least 58% of the TRR, corresponding to 1.4 mg/kg. The main metabolite in milk was M08 at a level of up to 8.7%. Several metabolites such as M07, M16, M17, M42, M43 and M44/M45, were detected at levels below 5% of the TRR. The metabolite M43 could not be quantified due to interference of other minor unknown metabolites and the lack of an authentic reference compound. A few other metabolites were near the LOQ of 0.9% of the TRR. The portion identified was about 83% of the TRR in milk (Table 4).

Table 4. Quantitative distribution of metabolites in the edible tissues and in milk after administration of [methylene-<sup>14</sup>C]thiacloprid to a lactating goat based on the first series of extractions.

Metabolite	Fat		Kidney		Liver		Muscle		Milk	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
M01	1.3	0.024	2.6	0.636	0.9	0.149	< 0.8	0.015	< 0.9	0.011
M07 <sup>1</sup>			4.4	1.090					3.5	0.087
M08			12.3	3.055	0.9	0.151			8.7	0.213
M10	< 0.8	0.007	3.3	0.812	< 0.8	0.104	< 0.8	0.017	1.4	0.035
M11	< 0.8	0.013	4.4	1.088	< 0.8	0.105	1.0	0.036	< 0.9	0.009
M12	< 0.8	0.013	10.1	2.500	< 0.8	0.049				
M13	< 0.8	0.012	7.1	1.769	< 0.8	0.060				
M15	1.1	0.020	0.8	0.200	0.8	0.148	0.9	0.035	< 0.9	0.019
M16	< 0.8	0.012	4.2	1.039	< 0.8	0.060			1.7	0.042
M17									1.6	0.039
M41			1.1	0.277					< 0.9	0.006
M42									2.3	0.057
M44/M45			2.1	0.513					1.0	0.026
thiacloprid	89.8	1.607	28.3	7.012	83.1	14.45	92.0	3.535	61.0	1.494
Unknown			10.0	1.931	2.4	0.411	2.9	0.112	3.6	0.048
Losses	4.6		9.3		9.8		2.3		13.2	
Extraction yield	97.1		95.3		93.8		98.5		91.9	
Identification	95.4	1.71	80.7	19.99	87.8	15.28	94.7	3.64	83.1	2.04

1) Metabolites not containing the thiazolidine heterocycle

### Laying hens

The kinetic behaviour and the metabolism of [methylene-<sup>14</sup>C]-thiacloprid were studied in laying hens (Weber, H.; Printz, H. and Klempner, A. 1998). The test compound was administered to six hens in tragacanth suspension in three oral doses of 10 mg/kg bw (corresponding to 124 ppm in feed on dry weight basis), one dose per day, on three consecutive days.

Radioactivity was measured in the excreta, plasma and eggs at different intervals. The animals were sacrificed 6 hours after the final dose, after which the edible tissues kidney, liver, skin, muscle and fat were radioassayed. Metabolite analyses were performed with the eggs and the edible tissues except kidney. Metabolites were extracted from eggs and edible tissues with acetonitrile and mixtures of acetonitrile and methanol with a saline solution. This extraction procedure was followed by a microwave extraction step. Purification was conducted by chromatographic techniques (TLC and HPLC). Metabolite identification was based on co-chromatography with authentic references in two different chromatographic systems or on spectroscopic evidence (mass- and NMR-spectroscopy as well as hyphenated techniques). The quantification of the metabolites was conducted by integrating the <sup>14</sup>C-signals in the chromatograms of the tissue extracts.

The absorption was fast so that the concentration-time-course of radioactivity in the plasma did not allow a determination of the absorption rate. A concentration of 1.54 µg/mL was obtained at the first sampling point (0.25 hours after dosing). The mean plasma concentration peaked at 3 hours with a mean value of approx. 1.6 µg/mL. Related to the dose of 10 mg/kg body weight, this value corresponded only to 16% of the so-called equidistribution concentration. The radioactivity was monophasically eliminated from the plasma with a half-life of 6.8 hours. Twenty-four hours after a single dose, the mean plasma concentration had declined to 0.19 µg/mL.

Until sacrifice the excretion amounted on average to 75.4% of the radioactivity totally administered. About 29.4% and 29.6% of the radioactivity totally eliminated during the whole test period was excreted within 24 hours after the first and the second administration, respectively. Another portion of 16.4% was excreted after the last dose until sacrifice. On average, only 0.06% of the total dose was determined in the eggs. The recovery of radioactivity and the excretion behaviour of the laying hens, after administration of a daily dose of 10 mg per kg body weight on three consecutive days, are presented in Table 5.

Table 5. Percentages of the total radioactivity excreted/secreted with urine, faeces and eggs.

Sample	Time after 1 <sup>st</sup> dose (h)	% of the total dose	
		Mean	CV (%) <sup>1</sup>
Excreta	24	29.37	11.31
	48	29.62	9.64
	54	16.36	32.52
Subtotal		75.35	10.22
Eggs; 0 - 54 h		0.06	53.18
Totally excreted		75.41	10.22
Estimated residue in tissues prepared		0.71	14.79
Recovery		76.12	10.16

1) CV: coefficient of variance

The highest equivalent concentrations were determined in the liver (3.061 mg/kg) and kidneys (2.404 mg/kg), respectively. The residue concentrations of the other edible tissues were at least fourfold lower. The average data are shown in Table 6.

Table 6. Residue levels of thiacloprid equivalents in the edible tissues and organs of laying hens.

Organ	Residue levels (mg/kg)
Liver	3.061
Kidney	2.404
Muscle (leg)	0.152
Muscle (breast)	0.128
Skin (without fat)	0.295
Fat (subcutaneous)	0.083
Eggs (prior to sacrifice)	0.424
Eggs (from oviduct)	0.652

The radioactivity was extracted with solvent followed by microwave extraction with recoveries above 93%. After purification the extracts were co-chromatographed in two different HPLC-systems with authentic <sup>14</sup>C-labelled reference compounds, which were previously isolated during the rat- and goat metabolism studies. All reference compounds were spectroscopically identified.

The unchanged parent compound was the major component in all extracts of edible tissues and eggs. Its concentration was higher in the more lipophilic matrices as compared to muscle or liver. Correspondingly, polar metabolites occurred at higher quantities in muscle and liver. In egg and fat extracts thiacloprid was found in quantities ranging from 48.2% to 71.8% of the TRR. In addition, up to four further polar metabolites, ranging from 1.3% to 8.9% of TRR were identified.

In muscle and liver extracts thiacloprid was found at quantities ranging from 17.3% to 19.4% of the TRR, while up to eight further polar metabolites, ranging from 1.1% to 5.1% of the TRR were identified. Table 7 gives a quantitative overview of the extraction yields and the amounts of identified compounds in the extracts of edible tissues and eggs.

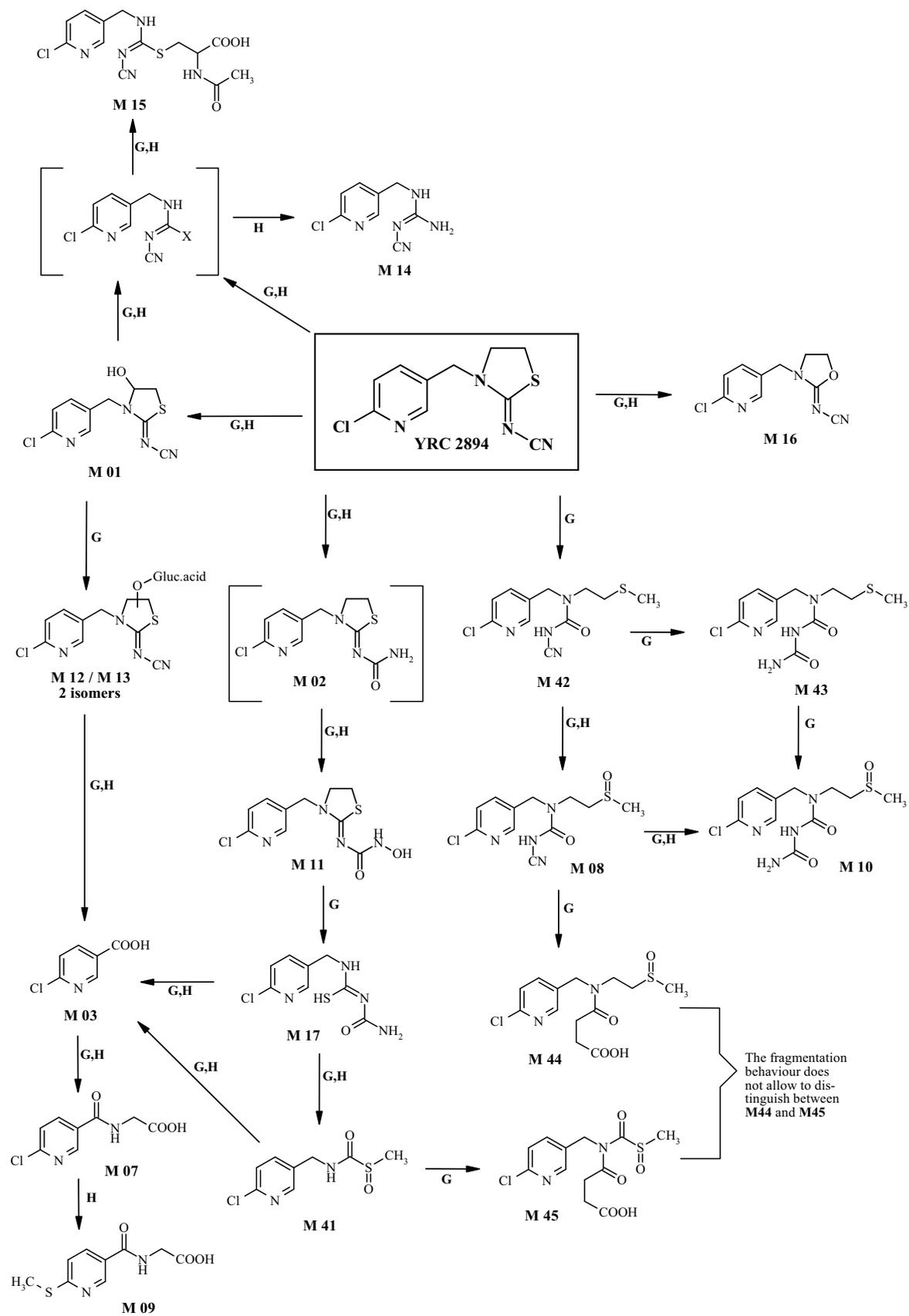
Table 7. Quantitative distribution of metabolites in the edible tissues and in eggs after administration of [methylene-<sup>14</sup>C]thiacloprid to laying hens.

Metabolite	Eggs		Liver		Muscle		Fat	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
M01	4.6	0.006	1.7	0.054	3.8	0.006		
M03 <sup>1</sup>	1.9	0.002			3.3	0.005		
M07 <sup>1</sup>	6.4	0.008	1.1	0.034	1.5	0.002		
M08			4.1	0.128			8.9	0.010
M09 <sup>1</sup>					1.4	0.002		
M10					5.1	0.007		
M11	1.3	0.002	4.6	0.144	10.9	0.016		
M14			4.6	0.142				
M15			1.5	0.047				
M16			2.8	0.088				
M41			2.4	0.076	4.8	0.007		
thiacloprid	48.2	0.059	17.3	0.537	19.4	0.028	71.8	0.077
Extraction yield	97.5		96.9		96.6		93.2	
Sum identified	62.5	0.077	40.2	1.250	50.2	0.073	80.8	0.087

1) Metabolites not containing the thiazolidine heterocycle ring

The metabolites found in the edible tissues and eggs of the laying hen were almost completely identical with those found in the edible tissues and milk of the lactating goat as well as those found in the rat metabolism study. Therefore, the proposed biotransformation pathway of thiacloprid shows the degradation in poultry and ruminants (Figure 1).

Based on the results of the livestock metabolism studies, the parent compound only is considered as relevant residue of concern for food commodities of animal origin.



G: Goat; H: Hen

Figure 1. Metabolic pathways of thiacloprid in goats and hens.

### *Plant metabolism*

The metabolism of thiacloprid has been studied after spray application in apples, tomatoes, cotton and wheat in compliance with the GLP.

#### *Apples*

Apples of the variety James Grieve were treated twice with [methylene-<sup>14</sup>C]-thiacloprid at an interval of 14 days (Clark, T. and Bornatsch, W. 1997). The last application was made 14 days prior to harvest. An aqueous suspension of the formulated product was applied uniformly to each of the apples using an Eppendorf syringe fitted with a tuft of hair at the tip. The following amounts were applied to each apple at both application dates: 104.8 µg 600 SC (50.6% ai), 53.0 µg ai, 0.22 MBq. The application rate was slightly exaggerated when compared to the annual recommended field rate of 300 g/ha thiacloprid. The apples were sampled 14 days after the second application (day 0).

In the scope of this study also a translocation experiment was conducted, in which [methylene-<sup>14</sup>C]-thiacloprid was applied on the same days as for the metabolism experiment. The tests were conducted each with one apple and the adjacent leaves above and below. The same solutions and method of application was used as for the metabolism experiment, i.e., the leaves received the same total amount of radioactivity as each apple in the metabolism experiment.

The apples were extracted with methanol/water (1:1) and methanol. The radioactivity in the extract was measured by liquid scintillation. The solids were air dried and aliquots taken and combusted. The identification was achieved by co-chromatography (TLC and HPLC) with the authentic reference compounds as well as by <sup>1</sup>H-NMR and mass-spectroscopic methods.

The total radioactive residue (TRR) in apples amounted to 0.74 mg/kg parent compound equivalents. The vast majority of the TRR was removed by surface washing with dichloromethane (84.4% or 0.62 mg/kg), 12.9% (0.10 mg/kg) was detected in the extract and only 2.7% (0.02 mg/kg) remained unextracted in the solids, which were not investigated further.

Of the radioactivity present in the surface wash solution, extract and solids 90.8% (0.67 mg/kg) was identified as unchanged parent compound. Only two other metabolites were detected in any significant quantities and these were identified as the 4-hydroxy derivative of the parent compound (M01; 2.2%, 0.02 mg/kg) and the amide (M02; 1.3%, 0.01 mg/kg). A summary of the distribution of metabolites in the different fractions of apples is presented in Table 8.

The results of the translocation experiments showed that some of the applied radioactivity (ca. 25% on average) was lost, probably due to volatilisation. Virtually all the recovered radioactivity was found in the treated leaves while only traces of parent compound and metabolites (0.05% on average) were translocated from the leaves to the apples above and below the treated leaves.

Table 8. Distribution of metabolites in the different fractions of apples.

Compound/Metabolite	% TRR	mg/kg parent equivalents
Surface wash solution	84.4	0.62
Thiacloprid	82.4	0.61
M01	1.4	0.01
M02	0.6	< 0.01
Extract	12.9	0.1
Thiacloprid	8.4	0.06
M01	0.8	0.01
M02	0.7	0.01
Polar radioactivity	3.0	0.02
Solids	2.7	0.02
Total	100	0.74

*Tomatoes - metabolism*

In a greenhouse 10 bunches of tomatoes (82 tomatoes) were sprayed twice with [methylene-<sup>14</sup>C]-thiacloprid at an interval of 14 days (Babczynski, P. 1997). The last application was made 14 days prior to the final harvest. An aqueous suspension of the formulated product was applied uniformly to each of the plants using a metre jet spray gun fitted with a flat-fan nozzle. Each bunch of tomatoes including the surrounding leaves and stalks was sprayed separately. In each application a total of 30 mL of formulation was applied which is equivalent to 7.9 mg ai or to 32.6 MBq of total radioactivity, respectively. This corresponded to an application rate of approximately  $2 \times 0.375$  kg ai/ha.

The tomatoes were harvested as follows: Immediately after the second application (day 0) five tomatoes were harvested. Three of these were used to calculate the TRR and to analyse the quantitative distribution of metabolites. The remaining two tomatoes were used to determine the efficiency of surface washing with methanol.

At day 3, after the second application, 29 tomatoes were collected while the final harvest of 38 tomatoes was performed at day 14. Eight tomatoes were also harvested at this time and stored at -20°C without surface wash as a reserve sample for the validation of the residue method.

The tomatoes were surface washed and extracted with methanol. The radioactivity in the extract was measured by liquid scintillation. The solids were air dried and aliquots taken and combusted. The identification was achieved by co-chromatography (TLC and HPLC) with the authentic reference compounds as well as by <sup>1</sup>H-NMR and mass-spectroscopic methods.

The TRR in tomatoes at day 0 amounted to 0.76 mg/kg parent compound equivalents. The vast majority of the TRR was removed by surface washing with methanol (95.8% or 0.72 mg/kg), 4.0% (0.03 mg/kg) was detected in the extract and only 0.2% (< 0.01 mg/kg) remained unextracted in the solids.

Tomatoes harvested at day 3 and 14 yielded TRR values of 0.77 and 0.94 mg/kg, respectively. Again, the biggest part could be removed by surface washing and amounted to 87.8% (0.68 mg/kg) on day 3 and 84.3% (0.79 mg/kg) on day 14. The respective amounts in the methanol extract were 11.2% (0.09 mg/kg) on day 3 and 14.1% (0.13 mg/kg) on day 14 indicating a slight increase of the uptake of radioactivity during this time. Also the level of radioactivity in the solids increased slightly from day 0 to day 3 (1.0%, < 0.01 mg/kg) and further to day 14 (1.6%, 0.02 mg/kg). The solids were not investigated further.

Of the radioactivity present in the surface wash solution and the extract 94.4% (0.88 mg/kg) was identified as unchanged parent compound. Six further metabolites were detected in low quantities ranging from < 0.01 to 0.03 mg/kg. The main metabolite was identified as a complex 6-chloropicolyl alcohol glucoside (M05; 2.8%, 0.03 mg/kg). Three further glucosides were detected (together 0.6%, < 0.01 mg/kg), one of which was the 6-chloropicolyl alcohol glucoside (M04, 0.3%, < 0.01 mg/kg). The other two remained unidentified. Two more metabolites were identified as the 4-hydroxy derivative of the parent compound (M01; 0.4%, < 0.01 mg/kg) and 6-chloronicotinic acid (M03; 0.2%, < 0.01 mg/kg). A total of 98.1% (0.92 mg/kg) of the TRR in tomatoes was identified. The results are summarised in Table 9.

Table 9. Distribution of metabolites in different fractions of tomatoes (day 14).

Compound/Metabolite	% TRR	Mg/kg parent equivalents
Surface wash solution	84.3	0.79
Identified	84.3	0.79
Thiacloprid	84.3	0.79
Methanol extract	14.1	0.13
Identified	13.8	0.09
Thiacloprid	10.1	< 0.01
M01	0.4	< 0.01
M03	0.2	< 0.01
M04	0.3	0.03
M05	2.8	< 0.01

Compound/Metabolite	% TRR	Mg/kg parent equivalents
Characterised as glucose conjugates of M04	0.3	< 0.01
Non extractable residues	1.6	0.02
Subtotal identified	98.1	0.92
Subtotal identified/characterised	98.4	0.92
Total residue	100	0.94

### *Tomatoes – translocation*

In a supplementary study to the above described metabolism study, the translocation in tomatoes was also investigated (Koester, J. 1997). [Methylene-<sup>14</sup>C-methyl]-thiacloprid, formulated as a 600 SC, was sprayed twice to the soil surface of four container grown plants. The application was based on the assumption that under GAP conditions a certain fraction of the application solution would reach the soil during and after spraying. The application rate was 0.55 mg active substance at the first and 0.58 mg active substance at the second application. The total application rate was equivalent to 89.7 g ai/ha. The time interval between the applications was 14 days. The tomatoes of the first two plants were harvested 3 days after treatment and those of the remaining two plants 14 days after the second application as a mixture of green, reddish, and red fruits.

The TRR in the tomatoes was determined by adding the radioactivity in the extracts and the air-dried solids after extraction. In all cases, less than 0.1% of the radioactivity applied to the soil surfaces was detected in the tomato fruits. From the total amount recovered, an average of 94.1% was found in the extracts, the remainder was measured in the unextracted solids. The transformation of the total residue concentrations to parent compound equivalents yielded in all cases concentrations below 0.001 mg/kg. As a result, further analyses on the extracts were not conducted.

### *Cotton*

[Methylene-<sup>14</sup>C-methyl]thiacloprid was applied to cotton in three spray applications (Babczynski, P. 1998). The cumulative application rate was 375 g ai/ha. The time interval between each of the treatments was seven days. 120 days after the last application the cotton plants were harvested, i.e., at the time of natural maturity.

Leaves, petals, gin trash, lint, and seeds were collected and homogenised. The homogenised samples were extracted with acetonitrile and acetonitrile/water (1:1). The residue remained in the extracted gin trash was further extracted using acetone/water (1:1) in a microwave at 120°C, and the aqueous remainder partitioned against n-hexane and dichloromethane. The residues in extracted seeds were further extracted with n-hexane, dichloromethane and acetone followed by an extraction of the resulting residue using acetic acid and acetone/water (1:1). The latter extraction step was repeated in a micro-wave. The combined aqueous phases were subsequently partitioned against dichloromethane and ethyl acetate. Radioactivity was determined in the extracts and the extracted solids.

Metabolites were purified from the extracts by solid phase extraction methods and identified by comparative thin-layer chromatography and HPLC with authentic reference compounds using different chromatographic methods. Mass- and NMR-spectroscopy were also employed for structure elucidation.

The total radioactive residue (TRR) in cotton gin trash at harvest amounted to 3.21 mg/kg (ai equivalents), i.e., 97.2% was extracted. The main component was the parent compound (73.5%, 2.36 mg/kg). Fourteen metabolites were detected, twelve of these amounted to 14.8% (0.48 mg/kg) of the gin trash residue. These were: 6-chloronicotinic acid (M03) as the main gin trash metabolite (3.3%, 0.11 mg/kg), 4-hydroxy thiacloprid (M01; 2.7%, 0.08 mg/kg), 6-chloro-picolyl alcohol (M36; 1.5%, 0.05 mg/kg) and its glucoside (M04; 1.2%, 0.04 mg/kg), two complex 6-CPA glucosides (glucosyl-pentoside [M39] and glucosylphosphate or -sulfate [M40]; each 1.1%, 0.04 mg/kg), the sulfonic acid derivative (M30; 0.9%, 0.03 mg/kg) and as a minor component monohydroxylated thiacloprid amide (M37; 0.4%, 0.01 mg/kg). Two further metabolites were identified as thiacloprid amide (M02; 1.9%,

0.06 mg/kg) and the olefin derivative of the parent compound (M38; not quantified). In total, 85.7% (2.76 mg/kg) of the TRR in cotton gin trash was identified.

The total radioactive residue in cotton leaves (including petals) amounted to 30.35 mg/kg ai equivalent. In total, 98.1% (29.77 mg/kg) was extracted; the non-extractable residue amounted to 1.9% (0.58 mg/kg). As in gin trash, the main component was thiacloprid (83.9%, 25.46 mg/kg). Thirteen metabolites were detected, amounting to 12.3% (3.73 mg/kg) of the leaves residue. Nine of these were identified, eight of them were also found in gin trash. These were: Two complex 6-CPA glucosides (M39; glucosyl-pentoside as the main leaf metabolite: 2.7%, 0.82 mg/kg; M40; glucosyl-phosphate or -sulphate: 1.4%, 0.43 mg/kg), 6-chloropicolyl alcohol (M36; 0.5%, 0.15 mg/kg) and its glucoside (M04; 1.2%, 0.37 mg/kg), 6-chloronicotinic acid (M03; 1.1%, 0.33 mg/kg), 4-hydroxylated thiacloprid (M01; 0.8%, 0.24 mg/kg), 4-hydroxylated thiacloprid amide (M37; 1.2%, 0.36 mg/kg) and as a minor component the sulfonic acid derivative (M30; 0.3%, 0.09 mg/kg). A further metabolite was characterised as a complex conjugate of 6-chloronicotinic acid with glucose and a plant constituent (possibly protocatechuic acid). This metabolite is probably similar to one of the complex 6-chloronicotinic acid conjugates described for cotton seed. The four unidentified metabolites were polar in nature and each amounted to  $\leq 1.2\%$  ( $\leq 0.37$  mg/kg). In total, 93.1% (28.25 mg/kg) of the TRR in cotton leaves was identified.

The TRR in cotton seed at harvest amounted to 1.12 mg/kg ai equivalents, 99.8% thereof was extracted. The main metabolite was free 6-chloronicotinic acid (M03) which accounted for 45.8% (0.51 mg/kg) of the TRR. Unchanged thiacloprid was only a minor component (0.6%, 0.01 mg/kg). Up to twenty further metabolites were detected totally accounting for 42.7% (0.48 mg/kg) of the TRR. That part of the seed residue which was neither free 6-chloronicotinic acid (M03) nor thiacloprid, 41.3% (0.46 mg/kg) was characterised after oxidation to comprise the 6-chloronicotinic acid-moiety by using permanganate oxidation as developed in total residue method for imidacloprid, a structurally related chloronicotinyl insecticide. Therefore, the total residue based on or identical with 6-chloronicotinic acid (including the parent compound) equalled 87.7% (0.98 mg/kg).

The distribution of metabolites in cotton is summarised in Table 10.

Table 10. Distribution of metabolites in different fractions of tomatoes (day 14).

Crop	Cotton leaves	Cotton seed
TRR = mg/kg	30.35	1.12
thiacloprid	83.9	0.6
M01	0.8	-
M03 <sup>1</sup>	1.1	45.8
M04 <sup>1</sup>	1.2	-
M30	0.3	-
M36 <sup>1</sup>	0.5	-
M37	1.2	-
M39 <sup>1</sup>	2.7	-
M40 <sup>1</sup>	1.4	-
Complex glucosides of M36	-	0.3
Complex glucosides of M03	-	29.7
Unknown (%)	5.0	23.4
Not extracted (%)	1.9	0.2
Total (%)	100	100

1) Metabolites not containing the thiazolidine heterocycle

### *Wheat*

The metabolism of thiacloprid was investigated in spring wheat following two applications with a spray interval of 14 days and a pre-harvest interval of 21 days (Bongartz, R. and Neumann, B. 2001). The actual application conditions simulated normal practice: Radiolabelled [methylene-<sup>14</sup>C]-thiacloprid was formulated as a 112.5 SE containing 100 g/L thiacloprid and 12.5 g/L of a mixing partner, which was replaced by water in the study. A computer controlled track sprayer with a flat-fan

nozzle was used for the two applications. In the first spray application 49.9 g ai/ha was applied to wheat at growth stage 75 of the BBCH code (medium milk stage). The second application of 44.8 g ai/ha followed 14 days later at growth stage 77 of the BBCH code (late milk stage). This resulted in a total application rate of 94.7 g ai/ha. Wheat hay was sampled seven days after the first application. Wheat straw and grain were harvested at maturity 21 days after the second application.

Hay, straw, and grain were homogenised and extracted with acetonitrile/water (1:1) and acetonitrile. The combined extracts for each sample material were partitioned with dichloromethane. All phases were chromatographed and quantitated by HPLC with radioactivity detection. The solid remained after the first extraction was extracted with acetonitrile/water (1:1) at 120°C using a microwave. After this, the residues remaining in straw were hydrolysed with dioxane/2N HCl (9:1). Metabolites were isolated by HPLC and identified by co-chromatography with authentic reference compounds or by mass spectroscopy.

The total radioactive residue (TRR) in hay, which received only one application, amounted to 2.04 mg/kg (parent compound equivalents), 94.6% was extracted by liquid-solid and additional 3% by microwave extraction. The main component was the parent compound (81.4%, 1.66 mg/kg). Many minor metabolites were detected, all amounting to  $\leq 0.03$  mg/kg each. Ten metabolites were identified: a conjugate of 6-chloronicotinic acid (1.7%, 0.03 mg/kg) and 6-chloronicotinic acid (M03, 1.2%, 0.03 mg/kg), 4-hydroxy-thiacloprid (M01, 1.6%, 0.03 mg/kg), the sulfonic acid derivative (M30, 1.2%, 0.03 mg/kg) and a conjugate thereof (0.4%, 0.01 mg/kg), thiacloprid diamide (M32, 0.5%, 0.01 mg/kg), 6-chloropicolyl alcohol (M36, 0.4%, 0.01 mg/kg), thiacloprid-olefin (M38, 0.4%, 0.01 mg/kg), thiacloprid-amide (M02, 0.2%,  $< 0.01$  mg/kg) and 3-aminocarbonyl-1-(6-chloro-pyridin-3-ylmethyl)-1-(2-hydroxy-ethyl)-urea (M25, 0.1%,  $< 0.01$  mg/kg). In total, 89.3% (1.82 mg/kg) of the TRR in hay was identified.

In straw the TRR amounted to 12.36 mg/kg (parent compound equivalents), 95.0% was extracted by liquid-solid and additional 3.1% by microwave extraction. The extraction residue was further treated with dioxane/HCl, which again released 1.2% of the TRR. The main component in straw was the parent compound (83.4%, 10.30 mg/kg). Ten metabolites were identified: 6-chloronicotinic acid (M03, 2.2%, 0.27 mg/kg) and a conjugate thereof (1.1%, 0.13 mg/kg), 4-hydroxy-thiacloprid (M01, 1.9%, 0.23 mg/kg), the sulfonic acid derivative (M30, 1.0%, 0.13 mg/kg) and a conjugate thereof (0.3%, 0.03 mg/kg), thiacloprid diamide (M32, 0.4%, 0.05 mg/kg), 6-chloropicolyl alcohol (M36, 0.3%, 0.04 mg/kg), thiacloprid-olefin (M38, 0.3%, 0.04 mg/kg), thiacloprid-amide (M02, 0.3%, 0.04 mg/kg) and 3-aminocarbonyl-1-(6-chloro-pyridin-3-ylmethyl)-1-(2-hydroxy-ethyl)-urea (M25, 0.1%, 0.01 mg/kg). In total, 91.3% (11.28 mg/kg) of the TRR in straw was identified.

The total radioactive residue (TRR) in grain amounted to 0.21 mg/kg (parent compound equivalents), 89.6% was extracted by liquid-solid and additional 4.8% by microwave extraction. The main component in grain was the parent compound (80.9%, 0.17 mg/kg). Only few minor metabolites were detected, all of them  $\ll 0.01$  mg/kg. Two metabolites were assigned to the conjugate of 6-chloronicotinic acid (1.7%,  $< 0.01$  mg/kg) and 4-hydroxy-thiacloprid (M01, 0.7%,  $< 0.01$  mg/kg). In total, 83.3% (0.17 mg/kg) of the TRR in grain was identified. The distribution of metabolites in wheat is summarised in Table 11.

Table 11. Distribution of metabolites in different fractions of wheat.

Crop crop part	Wheat hay	Wheat straw	Wheat grain
TRR = mg/kg	2.04	12.36	0.21
thiacloprid	81.4	83.4	80.9
M01	1.6	1.9	0.7
M02	0.2	0.3	-
M03 <sup>1</sup>	1.2	2.2	-
M25	0.1	0.1	-
M30	1.2	1.0	-
M32	0.5	0.4	-

Crop crop part	Wheat hay	Wheat straw	Wheat grain
M36 <sup>1</sup>	0.4	0.3	-
M38	0.4	0.3	-
Conjugate of M03	1.7	1.1	1.7
Conjugate of M30	0.4	0.3	-
Unknown (%)	8.3	8.0	11.1
Not extracted (%)	2.4	0.7	5.6
Total (%)	100	100	100

1 Metabolites not containing the thiazolidine heterocycle

### *Environmental fate in soil*

#### *Hydrolysis*

The test was performed to determine the rate of hydrolysis of thiacloprid in sterile aqueous solution at various pH values at 25°C and to obtain information on the identity and pattern of hydrolysis products (Brumhard, B. 1998). The hydrolysis of [methylene-<sup>14</sup>C]-thiacloprid was investigated in the dark at pH values of 5, 7 and 9 at a concentration of 0.35 mg ai/L. Test duration was 30 days with sampling intervals of 0, 2, 7, 13, 20 and 27 days. After the 30 days storage period thiacloprid recoveries were 95–98% of the applied radioactivity in all samples. In the pH range tested formation of hydrolysis products was only observed at pH 9 at amounts less than 2% of the applied radioactivity.

#### *Photolysis on soil surfaces*

The photo-transformation of [methylene-<sup>14</sup>C]-thiacloprid was studied (Brumhard, B. 1998) on thin layers of the sandy loam soil “Howe“ (IN/USA; 65.5% sand; 26.3% silt; 8.2% clay; 1.09% org. C; pH in CaCl<sub>2</sub>: 7.1) which was also used in the aerobic soil metabolism study. The dose rate was 2.34 mg/kg soil (dry substance) corresponding to about 350 g ai/ha (calculated for a soil density of 1.5 g/cm<sup>3</sup> and 1 cm depth). The water content of the samples was adjusted to 75% of the 1/3 bar moisture of the soil. The soil thin layers were continuously irradiated with a Xenon lamp simulating natural sunlight. The spectrum was cut off at wavelengths below 290 nm and the light intensity was 9.3 mW/cm<sup>2</sup>. The temperature of the testing system was maintained at 25 ± 1°C. Duplicate samples were taken for analysis 0, 4, 7, 13 and 18 days post-treatment. ‘Dark’ samples were taken 7 and 19 days post-treatment. Volatile radioactivity was trapped using soda lime and released for measurement by adding HCl.

Soils were exhaustively extracted by shaking with methanol immediately after sampling. Additionally, the soil was subjected to further extraction with methanol/water (50/50) at about 180°C using a Soxtec® high temperature extraction unit. The radioactivity was determined in all samples and the extracts analysed by AMD (automated multiple development)-TLC and HPLC-methods. Metabolites were identified by NMR- and mass-spectroscopy and by comparison with authentic reference compounds.

Under the experimental conditions thiacloprid degraded with an experimental half-life (DT<sub>50</sub>) of 18.8 days in the irradiated samples. This corresponds to a calculated environmental half-life of 74 days during midday and midsummer at 40° of latitude (Phoenix, AZ, USA). It is expected that the half-life at sites with less radiation intensity or in spring, fall or winter would be longer. The amount of unextracted residues was below 10% of the applied radioactivity. Besides the parent compound, one main degradate (M02) was observed in the extracts of irradiated and dark soil samples. At any time of the study all other products, individually made up less than 5% of the applied radioactivity. One of these metabolites was identified as the so-called “Dewar-pyridone” (M35). The results of the distribution of thiacloprid and its degradation products are summarised in Figure 2. Metabolic pathways of thiacloprid in plants

Table 12.

The degradation observed in the dark samples ( $DT_{50} = 6.3$  days) was about threefold faster as compared to the irradiated samples. It is therefore concluded from this study that under environmental conditions the solar reaction will contribute only to a very limited extent to the overall degradation of thiacloprid on soil surfaces.

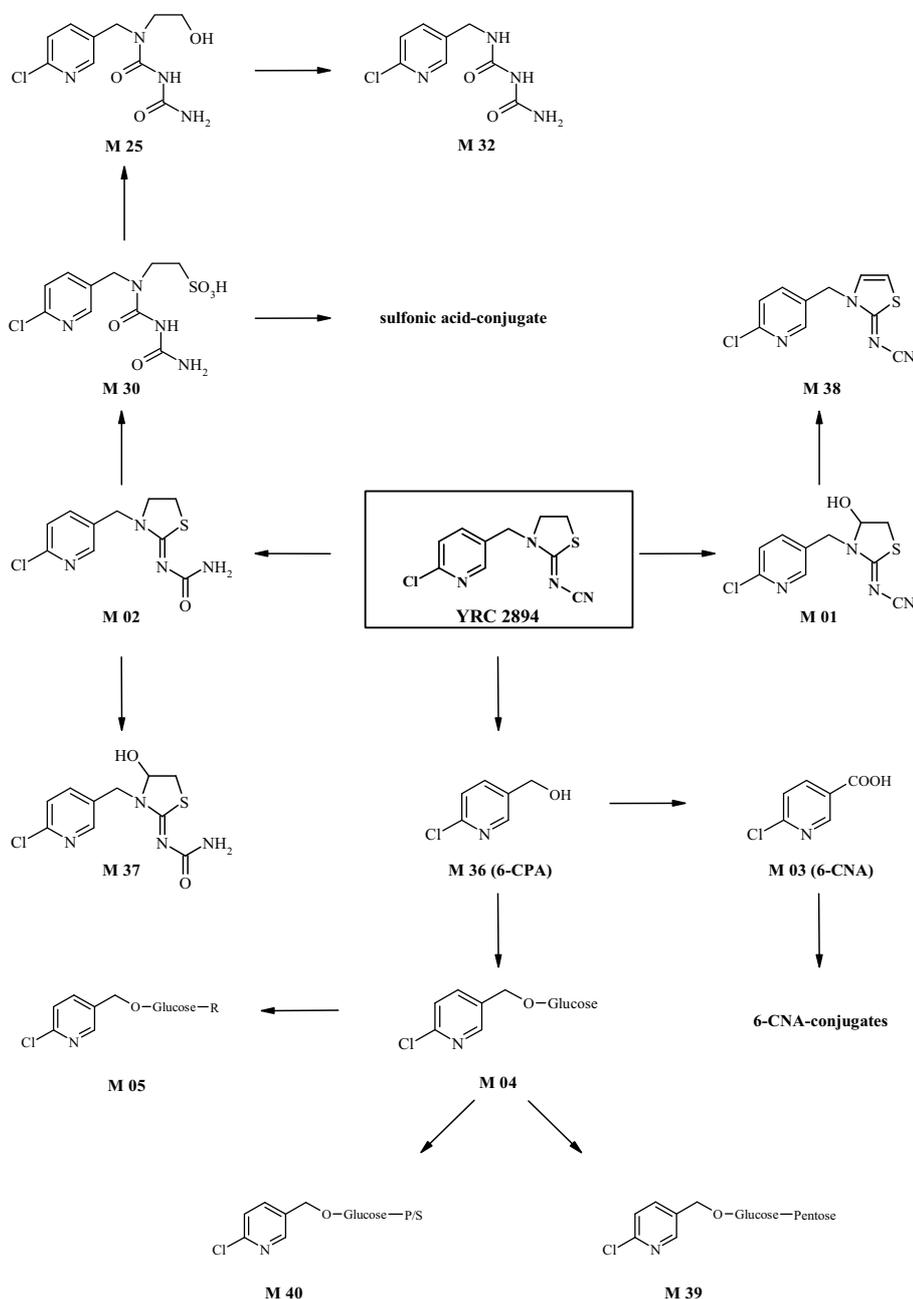


Figure 2. Metabolic pathways of thiacloprid in plants

Table 12. Recovery of radioactivity and distribution of the active substance and metabolites after application of [methylene- $^{14}$ C]-thiacloprid to thin soil layers of sandy loam under artificial light conditions and in the dark (in % of the applied radioactivity) [mean of two values].

Study	Conditions	Exposure time (days)	A.S. %	M02 %	M35 %	CO <sub>2</sub> %	Unknown %	Extracted %	Not extracted %	Total %
		0	94.1	0.6		< 0.1	1.4	96.1	4.6	100.7

Study	Conditions	Exposure time (days)	A.S. %	M02 %	M35 %	CO <sub>2</sub> %	Unknown %	Extracted %	Not extracted %	Total %
		4	81.6	5.6		0.1	7.1	94.3	7.0	101.4
Photolysis	Irradiated	7	78.8	7.9		< 0.1	7.2	94.4	7.4	101.9
	on soil	13	61.8	13.9	3.0	0.2	12.2	92.3	6.8	99.3
	surfaces	18	47.5	23.8	3.8	0.2	14.2	89.6	9.5	99.3
	Dark	0	94.1	0.6		< 0.1	1.4	96.1	4.6	100.7
	control	7	35.5	49.6	0.6	0.1	7.5	93.2	7.2	100.4
		19	11.1	69.8	0.7	0.3	10.9	92.3	7.7	100.3

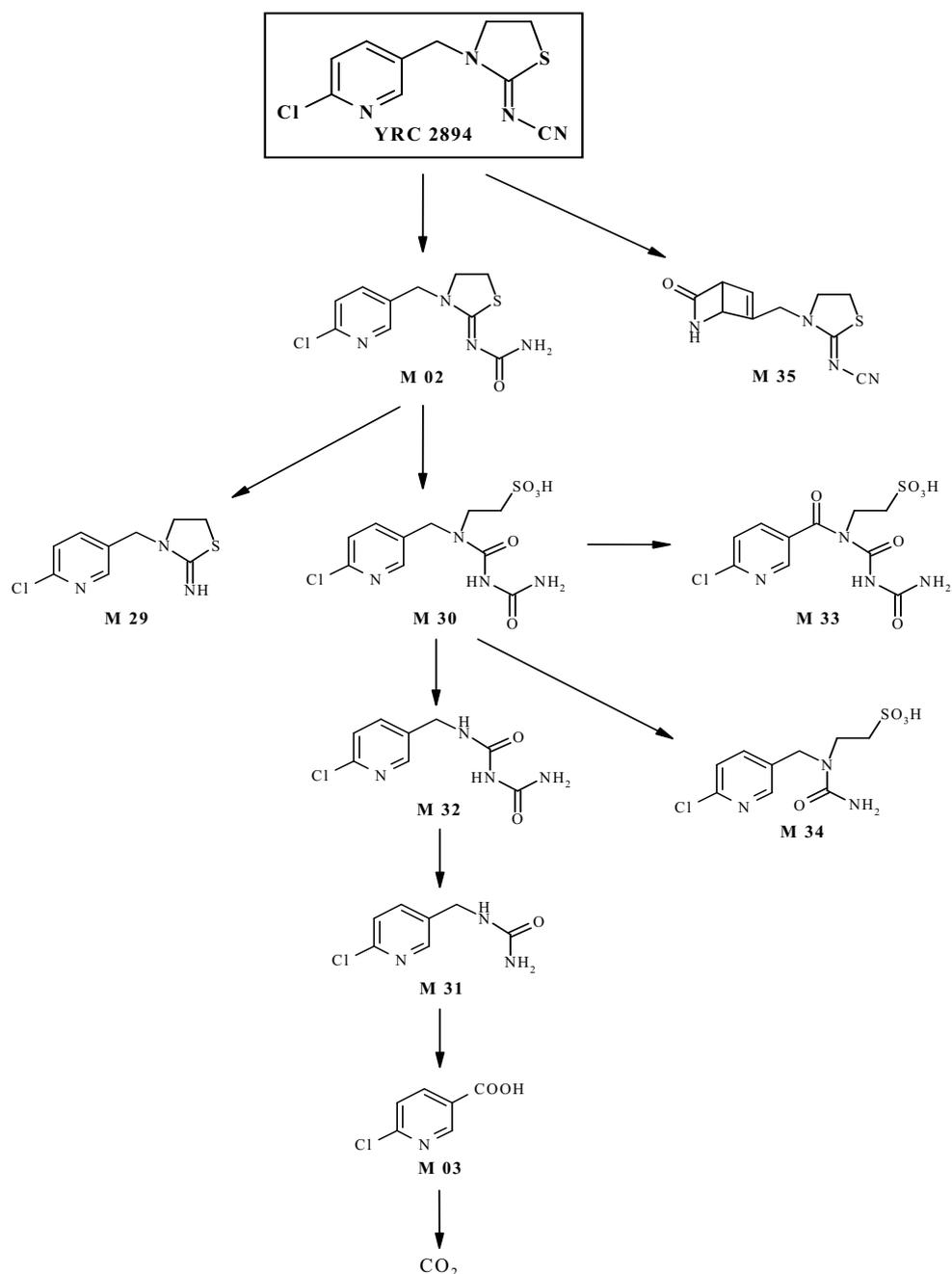


Figure 3. Proposed degradation pathway of thiacloprid in the soil, considering outdoor and photolysis on soil surfaces studies.

#### *Residues in rotational crops*

The metabolism of thiacloprid, formulated as a SC 480, was investigated (Clark, T. and Babczinski, P., 1998) in the following rotational crops spring wheat, lettuce and turnips planted into containers of soil treated with of [pyridinyl-<sup>14</sup>C-methyl]-thiacloprid. The rate applied was approximately 10% above the highest rate used in the first season of residue trials (375 g ai/ha). This was to allow for any losses during application. The soil was aged for 30 days and tilled to a depth of 15 cm prior to planting the first set of rotational crops. Lettuce was transplanted in one quarter of the soil area,

turnips were sown in a second quarter and spring wheat was sown in the remaining half. Lettuce was harvested on day 63 (i.e., 63 days after application) and turnips on day 105. Wheat was sampled at three different intervals, immature (day 70), hay (day 128) and maturity (day 170). The roots of lettuce and wheat were not harvested and remained in the soil for all rotations. Following the harvest of wheat, the soil was tilled (as for the first interval) and a second set of rotational crops were sown/transplanted as described above on day 170. In the second cycle the crops were sown/transplanted into different sectors of the container. The harvest days were as follows, lettuce day 220, turnips day 259, immature wheat day 212, wheat hay 232 and wheat grain and straw day 261. The above was repeated for the third rotation at the one year plant back interval (day 354). The harvest days were as follows, lettuce day 387, turnips day 441, immature wheat day 395, wheat hay 455 and wheat grain and straw day 526.

At maturity the wheat was separated into grain and straw. The glumes and the remainder of the ears were added to the straw fraction. Mature turnips were separated into bulbs and tops. The following seven plant fractions were obtained at each of the three intervals: Lettuce, turnip tops, turnip bulbs, immature wheat, wheat hay, wheat straw, and wheat grain. The individual plant fractions were macerated and extracted with methanol/water (1:1). Exhaustive extraction was achieved by microwave extraction using mixtures of acetonitrile/water. The radioactive content was measured by LSC in all extracts and the extraction residues after combustion. The extracts were cleaned by solid phase extraction, where necessary, and analysed by TLC and HPLC. Metabolites were identified by co-chromatography with authentic reference compounds and by spectroscopic methods.

A significant decrease in the TRR was observed over the whole period of the study although in some cases an increase was seen between the 30 and 170 day rotational crops. The TRR ranged from 0.005 mg/kg in turnip bulbs from the 354 day rotation to 2.6 mg/kg in wheat straw from the 170 day rotation. Overall, good extractability was achieved by conventional means, generally over 80%, after which microwave extraction was performed on the solids of the 2nd rotation to extract further radioactivity. A maximum of 9.5% of the TRR (turnip bulbs) was additionally extracted from any of the crops. In all cases, except wheat hay and straw, the amounts additionally extracted by microwave were all below 0.001 mg/kg. Only in wheat straw was the residue of any significance (0.15 mg/kg). Furthermore, radio-TLC showed that the radioactivity extracted by microwave was distributed over many components and therefore no further work was carried out on these samples. Due to the fact that the residues were generally very low and distributed over a number of components, the individual components were not quantified and were thus not accounted for in the distribution of metabolites. The total radioactive residue (TRR) based on fresh weight for each crop in each rotation is given in Table 13.

Table 13. Total radioactive residue (TRR) in rotational crops based on fresh weight.

	Thiacloprid Equivalents (mg/kg)		
	30 day Replant	170 day Replant	354 day Replant
Turnip, tops	0.174	0.088	0.032
Turnip, bulbs	0.014	0.016	0.005
Lettuce	0.111	0.081	0.023
Wheat, immature	0.203	0.128	0.122
Wheat, hay	0.283	0.558	0.135
Wheat, grain	0.101	0.145	0.019
Wheat, straw	1.655	2.595	0.322

In general, all crops had a similar metabolic profile. Metabolites detected in the crops were the thiacloprid amide (M02), 4-OH-thiacloprid amide (M37), 6-chloronicotinic acid (M03), 6-chloropicolyl alcohol (M36), 6-chloropico-lyl urea (M31), the sulfonic acid (M30), the imine (M29) and the sulfonic acid amide (M34), the latter most likely being an artefact formed from the sulfonic acid in the presence of methanol/water. The quantitative distribution of the metabolites is summarised in Table 14.

Table 14. Quantitative distribution of metabolites in rotational crops (values are given in % of the total radioactivity at harvest).

	Replant (days)	M36	M37	M02	M31	M03	M30	M34	M29	Unknown	Sum of metab. not containing thiazolidine	Extracted
Lettuce	30		39.1							52.7		91.9
	170	10.3	23.4	6.1		6.9	6.5		5.4	25.9	17.2	90.5
	354		14.5				17.4		8.6	43.0		83.5
Turnip bulbs	30	8.8	20.5	31.5			12.6			5.6	8.8	79.0
	170	5.0	7.4	17.5		9.8	16.1	7.5	4.8		14.8	82.2
	354											82.0
Turnip tops	30	12.1	20.4	42.3			6.1			9.9	12.1	90.8
	170	11.5	23.2	18.1	6.9		6.5		4.9	16.1	11.5	91.2
	354		45.8	23.3						18.3		87.4
Wheat forage	30		19.7	31.3			31.4	8.0				90.4
	170		11.6	28.2			39.7	14.0				94.8
	354		10.7	13.4			41.7	20.1		7.5		93.4
Wheat hay	30		13.4	25.1			39.3	8.8				86.6
	170		18.0	25.6			23.6	11.9		7.9		91.4
	354		12.7	15.1			34.4	17.3		7.6		87.1
Wheat grain	30		8.1					31.2		40.3		79.6
	170		14.8					27.4		40.7		88.1
	354											49.9
Wheat straw	30		11.2	13.9			31.2	9.0		17.2		82.5
	170		15.6	18.2			32.7	19.1				91.3
	354		15.9	10.5			24.5	17.9		14.1		83.0

Since most of the metabolites detected in the plants were either soil metabolites or their derivatives, it was concluded that the residues in the rotational crops resulted from uptake of soil metabolites which remained stable in the plants or to some degree were further metabolised by the plant. This is summarised in the proposed degradation scheme shown in Figure 4.

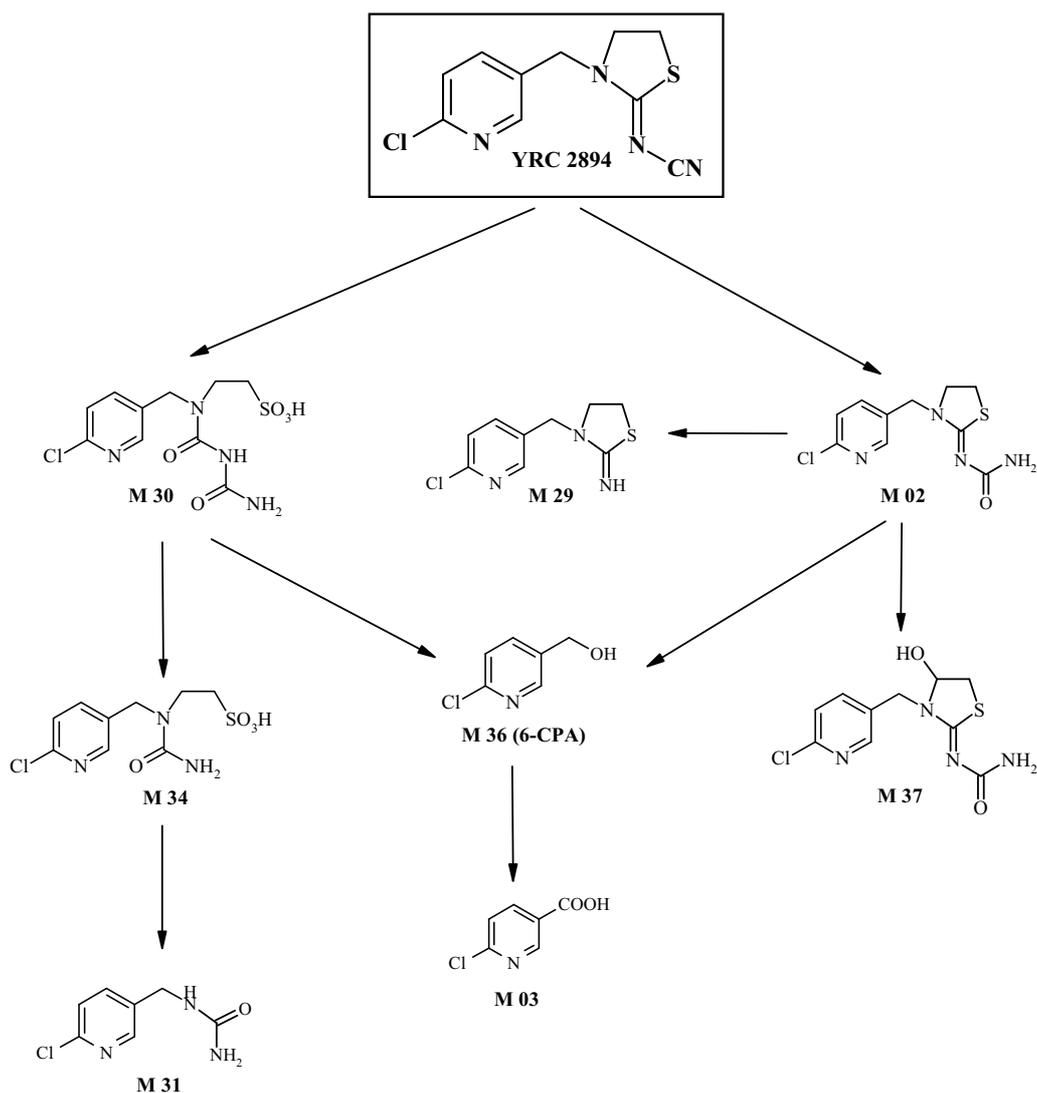


Figure 4. Metabolic pathway of thiacloprid in rotational crops

## METHODS OF RESIDUE ANALYSIS

### *Analytical methods*

#### *Plant matrices-enforcement method*

An analytical method for plant matrices based on HPLC-UV was reported (Report No.: MR-295/96 (Placke, F. J., 1996) and Report No.: 5438/1494225/T423 (Zyl, P. F. C. van, 2000)). Thiacloprid was extracted from 25 g of plant material with acetone/water (3:1; v:v). After vacuum filtration, an aliquot of the raw extract corresponding to a 5 g sample is concentrated and evaporated to the aqueous remainder. The residues are dissolved in water and partitioned against cyclohexane/ethyl acetate using a ChemElut column. Further clean-up is performed by column chromatography on Florisil and elution with acetonitrile. The residues of thiacloprid parent compound are quantified by reversed phase HPLC with UV detection at 242 nm.

Modifications for citrus: after elution, a partition clean-up step was included using a mixture of hexane and hexane-saturated acetonitrile. Florisil clean-up was not conducted.

The original method was validated by conducting recovery experiments with apple, cucumber, melon, red pepper, peach and tomato. Further recovery experiments were done using citrus matrices. Results obtained were within guideline requirements (recoveries: 70–110%; relative standard deviation (RSD) below 20%).

Control samples were spiked with thiacloprid at fortification levels of 0.02 and 0.2 mg/kg. Recoveries of thiacloprid ranged from 72 to 105% (overall mean: 95%, RSD: 5.8, n=97). Recoveries of thiacloprid for citrus matrices ranged from 77 to 101% (overall mean: 88%, RSD: 11%, n=6). The recoveries were not corrected for interferences. The results are summarised in Table 15 and Table 16.

Table 15. Recovery results from method 00419 for the determination of thiacloprid in plant matrices.

Matrix	Fortification level (mg/kg)	Recovery rate (%) meanrange		RSD (%)	Number of tests
Apple (fruit)	0.02*	101	98-103	1.9	5
	0.2	95	90-99	3.6	5
Apple (dried)	0.02*	82	72-88	10.6	3
	0.2	90	86-93	4.0	3
Apple (juice)	0.02*	98	94-100	3.3	3
Apple (pomace, dry)	0.02*	91	84-98	7.7	3
	0.2	86	97-97	0.0	3
Apple (sauce)	0.02*	98	95-100	2.6	3
	0.2	94	92-98	3.4	3
Cucumber (fruit)	0.02*	92	89-94	3.1	3
	0.2	90	83-96	7.4	3
Melon (peel)	0.02*	90	84-97	6.2	5
	0.2	98	92-101	3.5	5
Melon (pulp)	0.02*	95	92-97	2.7	3
	0.2	96	91-100	4.7	3
Red pepper (fruit)	0.02*	98	97-99	1.2	3
	0.2	95	92-99	3.7	3
Peach (fruit)	0.02*	98	91-103	6.4	3
	0.2	99	96-102	3.1	3
Peach (preserve)	0.02*	99	97-100	1.5	3
	0.2	95	93-96	1.6	3
Tomato (fruit)	0.02*	99	100-105	4.9	3
	0.2	100	97-104	3.6	3
Tomato (paste)	0.02*	98	97-99	1.0	3
	0.2	96	95-97	1.2	3
Tomato (juice)	0.02*	93	89-97	4.3	3
Tomato (preserve)	0.02*	94	90-98	4.3	3
	0.2	91	90-94	2.5	3

\*: Limit of quantitation (LOQ), defined by the lowest validated fortification level

Table 16. Recovery results from report no. 5438/1494225/T423 for the determination of thiacloprid in plant matrices.

Matrix	Fortification level (mg/kg)	Recovery rate (%) meanrange		Number of tests
Citrus (peel)	0.04	--	101	1
Citrus (flesh)	0.04	--	98	1
	0.08	--	87	1
	0.16	--	82	1
Citrus (whole fruit)	0.08	--	82	1
	0.20	--	77	1

The chromatographic separation in combination with the preceding clean-up steps allows quantitation of the parent compound without significant matrix interferences. Blank values from control samples were well below 30% of the LOQ.

The limit of quantification (LOQ), defined as the lowest concentration at which an acceptable recovery is obtained, was 0.02 mg/kg of thiacloprid for all crop matrices mentioned above. Matrix interference was minimal as illustrated in the control sample chromatograms (< 10% LOQ).

Amendment E001 to method 00419 (Placke, F. J., 1998) was conducted to validate additional plant matrices for cotton, potato, pear, aubergine (eggplant), zucchini (courgette) and cherry. The principle of the method corresponds to the original method no. 00419 (Placke, F. J., 1996).

The method was validated by conducting recovery experiments with the additional commodities cotton, potato, pear, aubergine, zucchini and cherry. Results obtained were within guideline requirements (recoveries: 70–110%; RSD below 20%). Control samples were spiked with thiacloprid at fortification levels of 0.02 and 0.2 mg/kg. Individual recoveries of thiacloprid ranged from 85 to 103% (mean per crop matrix 90–97%, RSDs 1.5–4.4%, n=3–10). The recoveries were not corrected for interferences. The results obtained are summarised in Table 17.

Table 17. Recovery results for method 00419/E001 for the determination of thiacloprid in plant matrices.

Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD (%)	Number of tests
		Mean	range		
Cotton (seed)	0.02*	93	92-96	1.7	5
	0.2	96	93-97	1.5	5
Potato (tuber)	0.02*	91	85-93	3.6	5
	0.2	93	91-95	1.6	5
Potato (French fries)	0.02*	94	92-96	1.9	3
	0.2	96	94-99	2.2	3
Cherry (juice)	0.02*	99	97-103	2.6	3
Pear (fruit)	0.02*	96	95-98	1.4	3
	0.2	98	97-99	0.8	3
Aubergine (fruit)	0.02*	89	86-91	2.2	5
	0.2	91	87-93	2.4	5
Zucchini (fruit)	0.02*	95	91-97	3.6	3
	0.2	99	97-100	1.3	3
Cherry (fruit)	0.02*	97	94-100	2.6	3
	0.2	93	91-94	1.6	3

\*: LOQ, defined by the lowest validated fortification level

An independent laboratory validation of methods 00419 and 00419/E001 was conducted with the representative matrices apple fruit (high acid content), potato tuber (high water content) and cotton seed (high fat content) (Weber, H., 1998). Minor modifications included using chemicals (acetonitrile, cyclohexane and pure water) from a different manufacturer.

Control samples were spiked with thiacloprid at fortification levels of 0.02 and 0.2 mg/kg. Results obtained were within guideline requirements (recoveries: 70–110%; RSD below 20%, n=5). Individual recoveries of thiacloprid ranged from 79 to 110%. Mean recoveries for each crop ranged from 84 to 101%, with RSDs ranging from 3.2 to 8.8%. Blank values were not used for correcting recoveries. The results obtained are summarised in Table 18.

Table 18. Recovery results from the independent laboratory validation of method 00419 for the determination of thiacloprid in plant matrices (Weber, H., 1998)

Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD (%)	Number of tests
		mean	range		
Apple (fruit)	0.02*	92	88-95	3.2	5
	0.20	92	83-97	6.1	5
Potato (tuber)	0.02*	84	79-88	4.0	5
	0.20	88	83-94	4.9	5
Cotton (seed)	0.02*	92	84-98	6.4	5
	0.20	94	85-102	7.3	5

\*: LOQ, defined by the lowest validated fortification level

The enforcement method 00419 is suitable for the determination of residues of thiacloprid parent compound. The LOQ was 0.02 mg/kg in all analysed crop matrices.

#### *Animal matrices-enforcement methods*

Residue analysis of thiacloprid parent compound in animal matrices can be done by HPLC-UV according to Placke, F. J., 1998a (method 00519). The method is suitable as an enforcement method.

Thiacloprid is extracted from animal matrices (tissues, eggs and milk) using a mixture of acetonitrile/water or methanol. For milk samples, partitioning of the extracts against n-hexane is performed to remove fat. The extracts are evaporated to the aqueous remainder. For egg samples, clean-up with a polystyrene column (Chromabond HR-P) is performed. The aqueous remainder is partitioned against cyclohexane/ethyl acetate using a ChemElut column. Further clean-up is performed by column chromatography on Florisil and elution with acetonitrile.

The residues are quantified by reversed phase HPLC with UV-detection at 242 nm. The method was validated by conducting recovery tests with muscle, milk and eggs.

Five control samples were spiked with thiacloprid at fortification levels of 0.02 and 0.2 mg/kg for eggs and muscle, and 0.01 and 0.1 mg/kg for milk, respectively. Recoveries of thiacloprid ranged from 82 to 101% (mean: 93%, relative standard deviation (RSD): 5.0%, n=30). The recoveries were not corrected for interference. Blank values were not used for correcting recoveries. The results obtained are summarised in Table 19.

Table 19. Recovery results for method 00519 for the determination of thiacloprid in animal matrices.

Reference	Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD (%)	n
			mean	range		
Placke, 1998 HPLC/UV, thiacloprid parent	Milk	0.01*	88	80-91	5.4	5
		0.1	95	90-100	4.2	5
	Muscle	0.02*	90	82-95	5.8	5
		0.2	94	92-101	4.1	5
	Egg	0.02	92	88-96	3.2	5
		0.2	94	93-96	1.2	5
HPLC/UV [confirmatory], thiacloprid parent	Milk	0.01*	87	78-95	8.6	5
		0.1	98	91-104	5.9	5
	Muscle	0.02*	90	80-94	6.2	5
		0.2	93	77-78	1.2	5
	Egg	0.02*	93	88-100	5.2	5
		0.2	94	93-95	0.8	5

\*: LOQ, defined by the lowest validated fortification level

An independent laboratory validation of method 00519 was conducted with the representative animal materials milk, egg and meat (Weber, H., 1998a). Duplicates of control- and fortified samples (five each at 0.02 and 0.2 mg/kg, except for milk with five each at 0.01 and 0.1 mg/kg) were extracted and analysed. Minor modifications included the use of chemicals of a different specification.

The method was validated for both, the higher and the lower fortification level. Recoveries at the lower level were in the range of 76 to 89% (mean: 82%; RSD: 6.0%) for egg, 75 to 87% (mean: 80%; RSD: 6.3%) for meat, and 85 to 95% (mean: 90%; RSD: 4.5%) for milk. Recoveries at the higher level were in the range of 76 to 102% (mean: 84%; RSD: 12.0%) for egg, 84 to 90% (mean: 86%; RSD: 2.8%) for meat and 93 to 102% (mean: 98%; RSD: 3.4%) for milk. The overall recoveries were 83% (RSD: 9.2%, n=10) for egg, 83% (RSD: 5.9%, n=10) for meat and 94% (RSD: 5.6%, n=10) for milk. Blank values were not used for correcting recoveries. The results obtained are summarised in Table 20.

Table 20. Recovery results from the independent method validation of method 00519 for the determination of thiacloprid in animal matrices.

Reference	Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD (%)	n
			mean	range		
Weber, 1998 HPLC/UV - ILV	Milk	0.01*	90	85-95	4.6	5
		0.1	98	93-102	3.5	5
	Muscle	0.02*	80	75-87	6.3	5
		0.2	86	84-90	2.8	5
	Egg	0.02*	82	76-89	6.0	5
		0.2	84	76-102	12	5

\*: LOQ, defined by the lowest validated fortification level

Enforcement method 00519 for the determination of residues of thiacloprid parent compound by HPLC-UV in a number of animal matrices was successfully validated by an independent laboratory. The LOQ is 0.01 mg/kg in milk and 0.02 mg/kg in muscle and egg.

#### *Specialised methods- thiacloprid only*

For thiacloprid additional specialised methods were presented. A summary of the validation data is given in Table 21.

Schoening (1998, 2001, 2002, 2005, 2005a), Billian, P. and Schoening (2003) and Sur, R. (2000) developed a HPLC-MS/MS method (method 00548) for the analysis of thiacloprid parent compound in various plant matrices. The plant material was extracted with a mixture of acetonitrile/water (1/1, v/v). The residues of thiacloprid parent compound are determined by reversed-phase HPLC on a C18-column using a triple-stage mass spectrometer (HPLC-MS/MS) with an electrospray interface (ESI: TurboIonSpray) operated in the positive ion mode under multiple-reaction monitoring (MRM) conditions.

Ballesteros, C. and Meilland - Berthier, I. (2004, 2005) modified method 00548. Modifications involve a change in the composition of the extraction solvent, and filtration and evaporation steps were replaced by centrifugation.

The original method 00548 was adapted by Clay, S. (2003) to produce a new method for the analysis of thiacloprid parent compound by HPLC-MS(SIM) in a number of plant matrices. The residues of thiacloprid were determined by reversed-phase HPLC on a C18-column using the positive SIM-mode after atmospheric pressure chemical ionisation (APCI). As quantification ion  $m/z = 253$  and as qualifier ion  $m/z = 255$  was used. Quantification was performed using matrix matched standards because signal suppression was observed in matrix standards versus solvent standards.

HPLC/UV based method was presented by Fukuda, T. (1998) for green tea. A comparable method for rice matrices relies on HPLC/UV also (Anon. 2002).

For walnuts Baravelli, P. L. (2003) used a method where the residues of thiacloprid parent compound are determined by reversed-phase HPLC using a triple-stage mass spectrometer (HPLC-MS/MS) with an electrospray interface (ESI: TurboIonSpray) operated in the positive ion mode under multiple-reaction monitoring (MRM) conditions for detection. For quantification the following parent and daughter ion were used:  $m/z = 230$  and  $m/z = 126$ , respectively. The daughter ion is used for quantification. Quantitation was done using external standards.

A method for animal matrices was developed by Schoening, R. (1998a). Thiacloprid is extracted from animal tissues using a mixture of acetonitrile/water, and from milk samples with methanol and diluted sulphuric acid. The residues are quantified by reversed phase HPLC with electrospray MS/MS-detection using deuterated thiacloprid as internal standard.

Table 21. Validation data for special analytical methods for the determination of parent thiacloprid residues in food of plant and animal origin.

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
Schoening, R., 1998	Apple (fruit)	0.02*	95	4.4	3
		0.2	91	1.7	3
	Aubergine (fruit)	0.02*	86	3.3	3
		0.2	93	1.6	3
	Cherry (fruit)	0.02*	88	4.7	3
		0.2	82	3.2	3
	Cherry (juice)	0.02*	84	2.6	5
		0.2	87	3.8	5
	Cotton (seed)	0.02*	79	5.7	5
		0.2	81	9.5	5
	Cucumber (fruit)	0.02*	88	1.3	3
		0.2	84	5.5	3
	Peach (fruit)	0.02*	86	6.5	3
		0.2	89	3.9	3
	Pepper (fruit)	0.02*	88	4.6	3
		0.2	85	5.3	3
	Potato (tuber)	0.02*	92	2.5	5
		0.2	97	3.0	5
Potato (green matter)	0.02*	88	2.4	3	
	0.2	98	8.5	3	
Potato (French fries)	0.02*	95	5.4	5	
	0.2	93	4.0	5	
Strawberry (fruit)	0.02*	87	3.0	5	
	0.2	90	3.2	5	
Strawberry (marmalade)	0.02*	86	1.5	5	
	0.2	90	2.5	5	
Tomato (fruit)	0.02*	99	4.2	3	
	0.2	95	4.8	3	
	Tomato (juice)	0.02*	89	0.9	5
		0.2	90	3.0	5
	Tomato (puree)	0.02*	93	1.6	5
		0.2	92	2.6	5
	Tomato (paste)	0.02*	91	5.6	3
		0.2	88	1.5	3
Schoening, R., 2001	Melon (pulp)	0.02*	98	2.6	3
		0.2	94	1.1	3
	Melon (peel)	0.02*	90	12.5	3
		0.2	93	4.1	3
	Currant (fruit)	0.02*	95	2.2	3
		0.2	94	5.9	3
	Plum (fruit)	0.02*	96	5.1	3
		0.2	95	3.0	3
Sugar beet (leaves)	0.02*	90	13.3	3	
	0.2	93	0.6	3	
Sugar beet (body)	0.02*	96	2.2	3	
	0.2	93	3.3	3	
Wheat (grain)	0.02*	100	4.4	3	
	0.2	99	1.2	3	
Wheat (rest of plant)	0.02*	98	3.6	3	
	0.2	93	4.7	3	

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
	Wheat (straw)	0.02*	94	6.9	3
		0.2	98	1.2	3
	Barley (grain)	0.02*	97	1.6	3
		0.2	95	1.1	3
	Barley (rest of plant)	0.02*	98	2.6	3
		0.2	95	3.7	3
	Barley (straw)	0.02*	96	1.2	3
		0.2	92	4.5	3
	Pea with pod	0.02*	100	0.0	3
		0.2	98	4.8	3
	Pea without pod	0.02*	97	3.3	3
		0.2	97	1.8	3
	Pea (pod empty)	0.02*	101	2.1	3
		0.2	96	2.2	3
Schoening, R., 2002	Rape (rest of plant, green material)	0.02*	92	3.1	3
		0.2	91	0.6	3
	Rape (pod)	0.02*	96	1.2	3
		0.2	94	2.8	3
	Rape (seed)	0.02*	96	1.0	3
		0.2	92	0.6	3
	Rape (straw)	0.02*	87	4.1	3
		0.2	84	2.5	3
Raspberry (fruit)	0.02*	96	1.6	3	
	0.2	93	0.6	3	
Schoening, R., 2005	Onion (whole plant)	0.01*	90	5.9	5
		0.1	97	1.0	3
Schoening, R., 2005a	Leek (whole plant)	0.01*	94	2.7	3
		0.1	93	2.3	4
	Zucchini (fruit)	0.02*	90	1.3	3
		0.2	88	2.0	3
Sur, R., 2000	Strawberry (fruit)	0.02*	87	3.0	5
		0.2	90	3.2	5
	Strawberry (marmalade)	0.02*	86	1.5	5
		0.2	90	2.5	5
	Tomato (juice)	0.02*	89	0.9	5
		0.2	90	3.0	5
	Tomato (puree)	0.02*	93	1.6	5
0.2		92	2.6	5	
Tomato (paste)	0.02*	91	5.6	5	
	0.2	88	1.5	5	
Billian, P. and Schoening, R., 2003	Bean (bean with pod)	0.01*	98	5.8	3
		0.02	97	1.6	3
		0.20	98	2.9	3
	Olive (fruit)	0.01*	99	1.5	3
		0.02	89	0.0	3
		0.20	89	1.3	3
	Olive (pomace wet)	0.01*	101	2.0	3
		0.02	88	0.7	3
		0.20	87	0.7	3
	Olive (oil)	0.01*	104	1.4	5
		0.20	98	3.4	5
	Broccoli (curd)	0.01*	97	2.2	5
		0.02	97	2.0	5
		0.20	97	2.4	5
	Cauliflower (curd)	0.01*	97	4.3	3
		0.02	97	3.3	3
		0.20	96	0.6	3
	Head Cabbage (head)	0.01*	96	1.2	3
		0.02	90	1.3	3
		0.20	96	0.6	3
	Brussels Sprouts	0.01*	100	0.6	3
		0.02	95	0.6	3
		0.20	94	1.1	3

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
	Kohlrabi (leaf)	0.01*	102	2.8	3
		0.20	94	0.6	3
	Kohlrabi (corm)	0.01*	99	1.0	3
		0.20	94	1.1	3
	Corn (whole plant)	0.01*	98	1.0	3
		0.20	98	2.6	3
	Corn (kernel)	0.01*	99	1.7	5
		0.20	96	0.5	5
	Corn (cob without husks)	0.01*	99	3.0	3
		0.20	97	0.0	3
	Artichoke (head)	0.01*	100	3.0	3
		0.20	103	0.0	3
	Lettuce (head)	0.01*	97	1.6	3
		0.20	96	2.6	3
Hazelnut (nut)	0.01*	98	0.6	3	
	0.02	95	0.6	3	
	0.20	96	1.2	3	
Ballesteros, C. and Meilland - Berthier, I., 2004	Zucchini (fruit)	0.01*	91	1.5	5
		0.10	93	1.1	5
	Pepper (fruit)	0.01*	96	3.3	3
		0.10	96	3.8	3
Ballesteros, C. and Meilland - Berthier, I., 2005	Sugar beet (body)	0.01*	99	1.5	3
		0.1	103	1.5	3
	Sugar beet (leaves with root collar)	0.01*	93	1.6	3
		0.1	88	2.4	3
	Tomato (fruit)	0.01*	104	3.6	3
		0.1	97	1.6	3
	Field pea	0.01*	90	4.0	3
		0.1	90	1.3	3
	Corn (kernel)	0.01*	84	4.1	3
		0.1	84	4.8	3
Corn (whole plant without roots)	0.05*	76	6.8	3	
	0.5	75	0.0	3	
Artichoke (head)	0.01*	83	1.2	3	
	0.1	88	1.3	3	
Watermelon (fruit)	0.01*	115	2.2	3	
	0.1	109	3.2	3	
Lettuce (head)	0.01*	98	4.3	3	
	0.1	100	2.6	3	
	Wheat (grain)	0.01*	92	2.9	3
		0.1	88	1.1	3
	Wheat (straw)	0.05*	89	6.9	3
		0.5	86	3.7	3
Barley (grain)	0.01*	93	4.4	3	
	0.1	93	3.8	3	
Barley (straw)	0.05*	100	2.0	3	
	0.5	93	4.4	3	
Clay, S. 2003	Kiwi whole fruit	0.02*	87	8	7
		0.20	91	8	7
	Peach fruit	0.02*	84	9.0	8
		0.02*	81	7.9	5
		0.20	93	5.3	8
		0.20	90	3.6	5
	Sweetcorn	0.02*	74	5.8	4
		0.20	82	4.6	5
	Lemon pulp	0.02*	78	6.8	5
		0.20	83	5.7	5
	Nectarine fruit	0.02*	103	9	5
		0.20	101	7	5

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
Fukuda, T. 1998	Green tea (leaf)	0.4*	87	0	2
		0.4	84	0	2
Anon., 2002	Rice grain	5.0	90	1.5	3
		1.0	86	3.2	3
		0.5*	88	4.0	3
	Rice husk	5.0	88	2.0	3
		1.0	84	2.0	3
		0.5*	88	3.1	3
	Rice straw	5.0	91	2.6	3
		1.0	84	4.9	3
		0.5*	88	2.0	3
Baravelli, P. L., 2003	Walnut	0.005*	101.0	-	1
		0.010	86.5	-	1
		0.050	98.6	-	1
		0.100	97.8	-	1
		0.500	83.1	-	1
		1.000	88.0	-	1
		5.000	89.7	-	1
Schoening, R., 1998a	Milk	0.01*	95	1.2	5
		0.1	94	3.2	5
	Muscle	0.02*	98	2.0	5
		0.2	95	3.7	5
	Liver	0.02*	95	2.1	3
		0.2	90	2.9	3
	Kidney	0.02*	90	2.3	3
		0.2	93	2.8	3
	Fat	0.02*	98	2.7	3
		0.2	95	2.4	3

\*: LOQ, defined by the lowest validated fortification level

### *Specialised methods- thiacloprid total residue*

For thiacloprid additional methods for the determination of the total residue containing the 6-chloropicolyl moiety were presented. A summary of the validation data is given in Table 21.

Schoening, R. (1999) and Babczinski, P. (1997a) developed a method, where thiacloprid and its metabolites were extracted from plant matrices with an acidic methanol / water mixture. After the clean-up thiacloprid and all metabolites containing the 6-chloropicolyl moiety were oxidised with alkaline potassium permanganate solution to yield 6-chloronicotinic acid. This was followed by acidification and reduction of the excess permanganate and the developed manganese dioxide with sodium bisulfite. The 6-CNA was converted to the corresponding trimethylsilyl ester with MSTFA prior to quantitation by gas chromatography with mass selective detection in the single-ion monitoring mode (GC-MS).

In a comparable method presented by DeHaan, R. A. (1999) and Perez, R. (1999) thiacloprid total residues were extracted with a mixture of methanol and sulfuric acid. Residues were treated with alkaline potassium permanganate, which oxidised thiacloprid and all metabolites containing the 6-CNA. The 6-CNA was extracted from the oxidised mixture and derivatized. The derivative, trimethylsilyl 6-chloronicotinate, was measured by gas chromatography/mass spectroscopy selected ion monitoring (GC/MS-SIM).

Orosz, F. (2000 and 2000a) validated the method for the analysis of thiacloprid total residue in rape seeds and sunflower.

A thiacloprid total residue method was presented by Schoening, R. (1998b) using GC-MS after oxidisation to 6-CNA and derivatization with MSTFA.

Table 22. Validation data for special analytical methods for the determination of total thiacloprid residues in food of plant and animal origin.

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
Schoening, R., 1999 and Babczinski, P., 1997a	Cotton (seed)	0.05*	81	4.1	5
		0.0507 <sup>1</sup>	85	3.2	5
		0.5	100	4.4	5
	Potato (tuber)	0.05*	84	8.1	5
		0.0507 <sup>1</sup>	86	2.9	5
		0.5	91	0.5	5
DeHaan, R. A., 1999	Apples (whole fruit)	Thiacloprid: 0.01*	88	7.3	9
		0.05	87	9.7	9
		0.3	90	1.7	3
		4-hydroxy-thiacloprid : 0.01*	61	7.7	13
		0.05	69	8.4	8
		0.3	61	2.3	3
	Apples (juice)	Thiacloprid: 0.01*	85	5.0	4
		0.25	84	8.4	3
		4-hydroxy-thiacloprid: 0.01*	68	4.2	3
		0.25	62	3.8	3
	Apples (wet pomace)	Thiacloprid: 0.01*	81	10.3	3
		0.6	89	4.6	3
		4-hydroxy-thiacloprid: 0.01*	58	5.7	3
		0.6	61	3.6	3
	Pears (whole fruit)	Thiacloprid: 0.01*	100	10.6	5
		0.05	87	13.3	7
		0.4	79	14.4	3
		4-hydroxy-thiacloprid: 0.01*	56	10.3	10
0.05		62	15.8	6	
0.4		59	8.9	3	
	Cotton (meal)	Thiacloprid: 0.05*	80	-	1
		6-CNA: 0.05*	98	-	1
		mix of equimolar amounts of thiacloprid and 6-CNA: 0.05*	88	-	1
	Cotton (hulls)	Thiacloprid: 0.05*	66	-	1
		0.2	65	-	1
		6-CNA: 0.05*	100	-	1
		0.2	87	-	1
		mix of equimolar amounts of thiacloprid and 6-CNA: 0.05*	66	-	1
		0.2	78	-	1

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses		
	Cotton (refined oil)	Thiacloprid: 0.05*	94	-	1		
		0.5	86	-	1		
		6-CNA: 0.05*	100	-	1		
		0.5	95	-	1		
		mix of equimolar amounts of thiacloprid and 6-CNA: 0.05*	94	-	1		
		0.5	91	-	1		
	Cotton (undelinted seed)	Thiacloprid: 0.05*	83	15.1	4		
		0.1	78	6.5	5		
		0.5	104	-	1		
		1.0	81	7.1	2		
		6-CNA: 0.05*	98	-	1		
		0.5	97	-	1		
		1.0	88	-	1		
		mix of equimolar amounts of thiacloprid and 6-CNA: 0.05*	82	-	1		
		0.5	102	-	1		
		1.0	78	-	1		
	Cotton (gin trash)	Thiacloprid: 0.05*	94	16.9	2		
		0.5	80	-	1		
		5.0	110	-	1		
		11	73	-	1		
		15	97	-	1		
6-CNA: 0.05*		106	-	1			
11		61	-	1			
mix of equimolar amounts of thiacloprid and 6-CNA: 0.05*		86	-	1			
11		71	-	1			
Perez, R., 1999		Cotton (seed)	Thiacloprid: 0.05*	83	9.9	2	
	1.0		77	5.7	2		
	6-CNA: 0.05*		89	5.7	2		
	1.0		124	0.0	2		
	Orosz, F. 2000		Rape (seed)	0.02*	89	20.8	7
				0.1	88	17.3	4
0.5		86		6.3	4		
Orosz, F. 2000a	Sunflower (seed)	0.02*	92	15.3	7		
		0.1	93	8.8	4		
		0.5	83	6.2	4		
Schoening, R., 1998b	Milk	Total residue: 0.01*	92	2.0	5		
		0.1	85	3.1	5		
		6-CP-urea sulfoxide: 0.01*	86	3.5	3		
	Muscle	0.02*	82	6.6	5		
		0.2	88	2.5	5		
		0.02*	87	1.3	3		
Liver							

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
		0.2	94	1.0	3
	Kidney	Total residue:			
		0.02*	85	4.2	3
		0.2	84	1.3	3
		6-CP-urea sulfoxide:			
		0.02*	64	3.5	3
	Fat	0.02*	102	3.7	3
		0.2	91	3.5	3

\*: LOQ, defined by the lowest validated fortification level

1: Fortification with a mixture of amide-thiacloprid and 6-CNA at 0.02 mg/kg, each, corresponding to 0.0507 mg/kg thiacloprid

### *Specialised methods- thiacloprid parent and metabolites*

An LC-MS/MS method for measuring thiacloprid, thiacloprid-amide, 4-hydroxy-thiacloprid-amide and thiacloprid-sodium sulfonate was developed by Moore, S. M., 2002 and Harbin, A. M., 2004. The analytes were extracted using methanol/water (3:1) followed by 18C solid phase extraction. The quantitation was based on comparison of daughter ion transitions between the analytes and their deuterated analogs, which were used as the internal standards.

Table 23. Validation data for special analytical methods for the determination of thiacloprid residues and its metabolites in food of plant and animal origin.

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses	
Moore, S. M., 2002	Soybean seed	Thiacloprid:				
		0.01*	98	4.8	10	
		0.1	95	0.58	3	
		thiacloprid-amide:				
		0.01*	96	4.1	10	
		0.1	80	2.9	3	
		4-hydroxy-thiacloprid-amide:				
		0.01*	102	2.5	10	
		0.1	91	2.1	3	
		thiacloprid-sodium-sulfonate:				
		0.01*	108	2.2	10	
		0.1	94	1.5	3	
	Soybean forage	Thiacloprid:				
		0.01*	97	5.0	8	
0.1		102	1.5	3		
thiacloprid-amide:						
0.01*		100	3.2	8		
0.1		100	1.0	3		
4-hydroxy-thiacloprid-amide:						
0.01*		101	3.0	8		
0.1	95	2.0	3			
thiacloprid-sodium-sulfonate:						
0.01*	111	2.9	8			
0.1	92	0.58	3			

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
	Soybean hay	Thiacloprid: 0.01*	94	3.1	8
		0.1	91	4.7	3
		thiacloprid-amide: 0.01*	103	6.2	8
		0.1	98	3.6	3
		4-hydroxy- thiacloprid-amide: 0.01*	100	1.8	8
		0.1	100	1.2	3
		thiacloprid- sodium-sulfonate: 0.01*	105	2.7	8
		0.1	91	1.5	3
		Wheat grain	Thiacloprid: 0.01*	93	2.8
	0.1		96	2.3	3
	thiacloprid-amide: 0.01*		94	3.5	9
	0.1		93	2.1	3
	4-hydroxy- thiacloprid-amide: 0.01*		92	4.4	9
	0.1		93	2.1	3
	thiacloprid- sodium-sulfonate: 0.01*		99	5.9	9
	0.1		93	1.2	3
	Wheat forage		Thiacloprid: 0.01*	94	2.2
		0.1	85	2.1	3
thiacloprid-amide: 0.01*		94	2.9	9	
0.1		85	1.7	3	
4-hydroxy- thiacloprid-amide: 0.01*		94	3.8	9	
0.1		85	1.5	3	
thiacloprid- sodium-sulfonate: 0.01*		107	4.4	9	
0.1		92	3.5	3	
Wheat hay		Thiacloprid: 0.01*	94	4.3	9
	0.1	91	1.0	3	
	thiacloprid-amide: 0.01*	93	4.5	9	
	0.1	91	2.1	3	
	4-hydroxy- thiacloprid-amide: 0.01*	95	4.3	9	
	0.1	87	0.58	3	
	thiacloprid- sodium-sulfonate: 0.01*	102	6.5	9	
	0.1	91	1.0	3	

Reference	Sample	Fortified level, mg/kg	Average recovery [%]	RSD [%]	No. of analyses
Harbin, A. M., 2004	Pecan nutmeat	Thiacloprid: 0.01*	97	3.2	7
		thiacloprid-amide: 0.01*	97	4.3	7
		4-hydroxy-thiacloprid-amide: 0.01*	98	3.2	7
	Almond nutmeat	Thiacloprid: 0.01*	96	1.9	6
		thiacloprid-amide: 0.01*	96	6.3	6
		4-hydroxy-thiacloprid-amide: 0.01*	97	2.3	6
	Almond hulls	Thiacloprid: 0.01*	79	7.2	9
		thiacloprid-amide: 0.01*	86	3.0	9
		4-hydroxy-thiacloprid-amide: 0.01*	89	5.8	9

### *Stability of residues in stored analytical samples*

Storage stability was examined in three different water-containing crop commodities (apple fruit, tomato fruit, melon peel), and in cotton seed and potato tuber, representing oil-containing and starch-containing matrices, up to a period of 18 months. In a follow-up study, freezer storage stability was demonstrated for the extended period of 24 months in the additional crops tobacco, wheat, rape, pea, currant and potato. A summary of the results is presented in Table 24.

In the study by Placke, F.J. (1997), samples of apple, tomatoes and melons were fortified with 0.2 mg/kg thiacloprid each. Immediately after fortification, a sample from each matrix was taken to determine the initial residues (fortification level). The remaining fortified samples were deep frozen (approx. -20°C) and analysed after nominal storage intervals of 1, 3, 6, 12 and 18 months.

Schoening, R. (2000 & 2005a) examined the storage stability of thiacloprid using samples of potato tubers, cotton seed, wheat straw, rape seed, peas with pods, currants and tobacco leaves. Tobacco leaf was fortified with a level of 2 mg/kg, all other samples with 0.2 mg/kg. The remaining fortified samples were deep frozen (approximately -20°C) and analysed after nominal storage intervals of 1, 3, 6, 12, 18 and 24 months.

Table 24. Stability of residues in stored analytical samples.

Reference	Commodity and fortification level	Storage Interval (days)	Procedural recovery (%)	Thiacloprid in stored sample, uncorrected (%)
Placke, F.J. 1997	Tomato, fruit 0.2 mg/kg	0	-	90.5
		33	76.5	78.7
		90	96.9	95.6
		180	92.3	95.2
		365	95.8	96.2
		540	96.2	97.6
	Apple, fruit 0.2 mg/kg	0	-	89.7
		32	95.0	99.5
		89	98.9	98.9
		180	92.1	87.7
		364	94.2	95.0
		539	96.1	97.2

Reference	Commodity and fortification level	Storage Interval (days)	Procedural recovery (%)	Thiacloprid in stored sample, uncorrected (%)	
	Melon, peel 0.2 mg/kg	0	-	83.8	
		29	87.1	88.4	
		90	94.4	97.7	
		182	89.3	91.2	
		365	92.3	91.8	
		540	95.4	94.6	
Schoening, R. 2000	Potato, tuber 0.2 mg/kg	0	-	98.6	
		75	99.9	101.2	
		152	93.3	94.5	
		300	94.5	95.7	
		540	100.3	98.9	
	Cotton, seed 0.2 mg/kg	0	-	93.9	
		75	103.2	94.5	
		152	99.3	97.0	
		300	95.0	100.0	
		540	99.1	93.4	
	Schoening, R. 2005a	Potato, tuber 0.2 mg/kg	0	-	105
			30	110	108
90			100	101	
180			99	98	
360			95	96	
540			102	98	
730			96	92	
Wheat, straw 0.2 mg/kg		0	-	104	
		30	106	100	
		90	97	97	
		180	100	96	
		360	102	96	
		540	91	91	
		730	93	91	
Tobacco, leafs dry 2 mg/kg		0	-	104	
		30	103	102	
		90	92	97	
		180	102	102	
		360	105	106	
		540	93	92	
		730	95	96	
Peas with pod 0.2 mg/kg		0	-	107	
		30	108	106	
		90	104	101	
		180	105	101	
		360	102	99	
		540	100	92	
		730	93	102	
Rape seed 0.2 mg/kg		0	-	105	
		30	107	106	
		90	101	96	
		180	100	95	
		360	101	103	
		540	95	91	
		730	95	97	
Currant, fruits 0.2 mg/kg		0	-	106	
		30	108	108	
		90	102	99	
		180	101	94	
		360	102	93	
		540	95	85	
		730	98	90	

## USE PATTERNS

Thiacloprid is registered globally as an insecticide and is used for foliar treatment on a wide variety of crops. The information available to the Meeting on registered uses relevant to the supervised field data is summarised in Table 25. It is based on the labels or translation of labels provided by the manufacture.

Additional uses were also submitted by the Queensland Government Department of Primary Industries and Fisheries, Australia.

Table 25. Registered uses of thiacloprid.

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Almond	United Kingdom	SC, 48	0.18	0.018	2	
American upland	Israel	SC, 48	0.19	0.095 - 0.19	1	21
Apple	Argentina	SC, 48	0.072 – 0.084 kg ai/m canopy height	0.004 - 0.006 per m canopy height	2	14
Apple	Belgium	SC, 48	0.06 per m canopy height	0.004 - 0.006 per m canopy height	2	14
Apple	Chile	SC, 48		0.0096	2	1
Apple	Croatia	SC, 48		0.0096	2	14
Apple	Cyprus	SC, 48		0.0096 - 0.014	2	14
Apple	Czech Republic	SC, 48	0.04 - 0.06 per m canopy height	0.004 - 0.006 per m canopy height	2	14
Apple	Estonia	SC, 48	0.072 - 0.096	0.00960 - 0.019	1	14
Apple	Georgia	SC, 48	0.096 - 0.14			
Apple	Greece	SC, 48	0.096 - 0.18	0.0096 - 0.012	2	14
Apple	Hungary	SC, 48		0.014	3	14
Apple	Israel	SC, 48	0.2	0.01	2	3
Apple	Italy	SC, 48	0.18	0.012	2	14
Apple	Japan	WG, 30	(1.05)	0.015	3	7
Apple	Latvia	SC, 48		0.072 - 0.096	2	14
Apple	Lithuania	SC, 48		0.048 - 0.096	3	14
Apple	Mexico	SC, 48	Min. 0.14	0.014		30
Apple	Morocco	SC, 48	(0.014)	0.0067		14
Apple	Netherlands	SC, 48	0.12	0.012	2	14
Apple	New Zealand	SC, 48	0.17	0.029	2	42
Apple	Poland	SC, 48	0.096	0.013 - 0.019	1	14
Apple	Portugal	SC, 48	0.096	0.0096	2	14
Apple	Romania	SC, 48	0.144	0.0096		
Apple	Russia	SC, 48		0.014	2	28
Apple	Slovakia	SC, 48	0.096	(0.0096)	2	14
Apple	Slovenia	SC, 48	0.144	0.0096	2	14
Apple	South Africa	SC, 48		0.0072	4	14
Apple	South Korea	SC, 10		0.0005	5	21
Apple	Spain	SC, 48	(0.18)	0.0096	2	14
Apple	Tunisia	SC, 48		0.0096	3	30
Apple	Turkey	SC, 48		0.0096		14
Apple	United Kingdom	SC, 48	0.18	0.012 - 0.018	2	14
Apricot	Australia	SC, 48	0.27	0.018	3	14
Apricot	Cyprus	SC, 48		0.0096	2	14
Apricot	Germany	SC, 48	0.048 per m canopy height	0.0032	1	21
Apricot	Italy	SC, 48	0.18	0.012		14
Apricot	Slovenia	SC, 48	0.18	0.012	2	14
Apricot	Spain	SC, 48		0.014	2	14
Aubergine	Brazil	SC, 48	0.096	(0.0096)		7
Aubergine	Cyprus	SC, 48		0.014	3	3
Aubergine	Greece	SC, 48	0.216	0.014	2	3
Aubergine	Italy	SC, 48	0.14	0.014		3

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Aubergine	Japan	WG, 30	0.23	0.0075	3	1
Aubergine	Kenya	SC, 48	0.19	(0.019)	4	3
Aubergine	Netherlands (greenhouse use)	SC, 48		0.012	4	1
Aubergine	Netherlands (greenhouse use, drip irrigation)	SC, 48	0.12		1	3
Aubergine	Slovenia	SC, 48	0.21	0.014	2	3
Aubergine	South Korea	SC, 10		0.00025	3	3
Aubergine	Spain	SC, 48		0.014	3	3
Aubergine	United Kingdom	SC, 48	0.22	max. 0.022	3	3
Barley	Romania	SC, 48	0.048	0.012 - 0.016	1	
Bell Pepper	Tunisia	SC, 48		0.014	2	3
Berries	Switzerland	SC, 48	0.096	0.0096	2	21
Bilberry	Netherlands	SC, 48	0.14	0.012	2	3
Bilberry	United Kingdom	SC, 48	0.12	0.024	3	3
Black currants	Latvia	SC, 48	0.072	(0.019)	2	14
Blackberry	Germany	SC, 48	0.096	0.0096	2	14
Blackberry	Netherlands	SC, 48	0.14	0.012	2	3
Blackberry	Poland	SC, 48	0.072	0.0096	2	5
Blackberry	United Kingdom	SC, 48	0.12	0.024	3	3
Blueberry	Germany	SC, 48	0.096	0.0096	2	14
Blueberry	Netherlands	SC, 48	0.14	0.012	2	3
Blueberry	United Kingdom	SC, 48	0.12	0.024	3	3
Cherry	Australia	SC, 48	0.27	0.018	3	14
Cherry	Croatia	SC, 48	0.096	0.0048	2	14
Cherry	Cyprus	SC, 48		0.0096	2	14
Cherry	Czech Republic	SC, 48	0.096	0.0096	2	14
Cherry	Germany	SC, 48	0.048 per m canopy height	0.0032	2	14
Cherry	Hungary	SC, 48		0.0067	3	14
Cherry	Japan	WG, 30	(1.05)	0.015	2	1
Cherry	Netherlands	SC, 48	0.12	0.012	2	14
Cherry	Poland	SC, 48	0.096	0.013 - 0.019	1	14
Cherry	Poland	SC, 49	0.048	0.007 - 0.01	1	14
Cherry	Romania	SC, 48	0.096	0.0096	2	14
Cherry	Slovakia	SC, 48	0.096			14
Cherry	Slovenia	SC, 48	0.18	0.012	2	14
Cherry	Turkey	SC, 48		0.0096		14
Cherry	United Kingdom	SC, 48	0.15	0.015	2	14
Chestnut	United Kingdom	SC, 48	0.18	0.018	2	
Chili	Belize	SC, 10	0.1	(0.02)		21
Chili	Costa Rica	SC, 10	0.1	(0.02)		21
Chili	Dom. Republic	SC, 10	0.1	(0.02)		21
Chili	El Salvador	SC, 10	0.1	(0.02)		21
Chili	Guatemala	SC, 10	0.1	(0.02)		21
Chili	Honduras	SC, 10	0.1	(0.02)		21
Chili	Kenya	SC, 48	0.19	(0.019)	4	3
Chili	Netherlands (greenhouse use)	SC, 48		0.012	4	1
Chili	Netherlands (greenhouse use, drip irrigation)	SC, 48	0.12		1	3
Chili	Nicaragua	SC, 10	0.1	(0.02)		21
Chili	Panama	SC, 10	0.1	(0.02)		21
Citrus	Brazil	SC, 48		0.0048		21
Citrus	Georgia	SC, 48	0.19 - 0.24			
Citrus	South Africa	SC, 48		0.0067		
Citrus	South Korea	SC, 10		0.0024	3	14
Cotton	Argentina	SC, 48	0.096		1	
Cotton	Belize	SC, 10	0.1	(0.02)		21
Cotton	Brazil	SC, 48	0.096	0.096	1	28

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Cotton	Costa Rica	SC, 10	0.1	(0.02)		21
Cotton	Dom. Republic	SC, 10	0.1	(0.02)		21
Cotton	El Salvador	SC, 10	0.1	(0.02)		21
Cotton	Greece	SC, 48	0.072	0.01	2	21
Cotton	Guatemala	SC, 10	0.1	(0.02)		21
Cotton	Honduras	SC, 10	0.1	(0.02)		21
Cotton	India	SC, 24	0.14	0.024		52
Cotton	Israel	SC, 48	0.19	0.095 - 0.19	1	21
Cotton	Mexico	SC, 48	0.072		1	14
Cotton	Nicaragua	SC, 10	0.1	(0.02)		21
Cotton	Panama	SC, 10	0.1	(0.02)		21
Cotton	Peru	SC, 48	(0.096)	0.024		
Cotton	Spain	SC, 48	0.096		3	21
Cotton	Turkey	SC, 48	0.12			28
Cotton	USA	WG, 70	0.1		6	14
Cotton	USA	SC, 48	0.089		6	14
Courgette	Greece	SC, 48	0.21	0.014	2	3
Courgette	Italy	SC, 48	0.14	0.014	2	3
Courgette	Kenya	SC, 48	0.19	0.019	3	3
Courgette	Netherlands	SC, 48		0.012	4	1
Courgette	Slovenia	SC 48	0.21	0.014	2	3
Courgette	Spain	SC, 48		0.014	3	3
Courgette	United Kingdom	SC, 48	0.22	min. 0.022	3	3
Cranberry	Netherlands	SC, 48	0.14	0.012	2	3
Cranberry	United Kingdom	SC, 48	0.12	0.024	3	3
Cucumber	Belize	SC, 10	0.1	(0.02)		21
Cucumber	Brazil	SC, 48	0.096	0.0048		7
Cucumber	Costa Rica	SC, 10	0.1	(0.02)		21
Cucumber	Croatia	SC, 48	0.14		2	4
Cucumber	Cyprus	SC, 48		0.014	3	3
Cucumber	Dom. Republic	SC, 10	0.1	(0.02)		21
Cucumber	El Salvador	SC, 10	0.1	(0.02)		21
Cucumber	Georgia	SC, 48	0.15			
Cucumber	Greece	SC, 48	0.14	0.0096	2	3
Cucumber	Guatemala	SC, 10	0.1	(0.02)		21
Cucumber	Honduras	SC, 10	0.1	(0.02)		21
Cucumber	Italy	SC, 48	0.14	0.014	2	3
Cucumber	Kenya	SC, 48	0.19	0.019	3	3
Cucumber	Netherlands	SC, 48	0.12	0.012	4	1
Cucumber	Nicaragua	SC, 10	0.1	(0.02)		21
Cucumber	Panama	SC, 10	0.1	(0.02)		21
Cucumber	Slovakia	SC, 48		0.014		3
Cucumber	Slovenia	SC, 48	0.21	0.014	2	3
Cucumber	South Korea	SC, 10		0.0005	3	3
Cucumber	Spain	SC, 48		0.014	3	3
Cucumber	United Kingdom	SC, 48	0.22	min. 0.022	3	3
Currants	Germany	SC, 48	0.096	0.0096	1	21
Currants	Netherlands	SC, 48	0.14	0.012	2	3
Currants	United Kingdom	SC, 48	0.12	0.024	3	3
Garlic	Belize	SC, 10	0.1	(0.02)		21
Garlic	Brazil	SC, 48	(0.077)	0.0096		21
Garlic	Costa Rica	SC, 10	0.1	(0.02)		21
Garlic	Dom. Republic	SC, 10	0.1	(0.02)		21
Garlic	El Salvador	SC, 10	0.1	(0.02)		21
Garlic	Guatemala	SC, 10	0.1	(0.02)		21
Garlic	Honduras	SC, 10	0.1	(0.02)		21
Garlic	Nicaragua	SC, 10	0.1	(0.02)		21
Garlic	Panama	SC, 10	0.1	(0.02)		21
Gherkin	Greece	SC, 48	0.21	0.014	2	3
Gherkin	Netherlands	SC, 48		0.012	4	1
Gooseberry	Germany	SC, 48	0.096	0.0096	1	21
Gooseberry	Latvia	SC, 48	0.072	(0.019)	2	14

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Gooseberry	Netherlands	SC, 48	0.14	0.012	2	3
Gooseberry	United Kingdom	SC, 48	0.12	0.024	3	3
Grains	Latvia	SC, 48	0.1		2	14
Grape	Japan	WG, 30	0.53	0.0075	2	21
Green Pepper	Japan	WG, 30	0.23	0.0075	3	1
Hazelnut	Germany	SC, 48	0.096	0.0096	2	
Hazelnut	Turkey	SC, 48		0.012		21
Hazelnut	United Kingdom	SC, 48	0.18	0.018	2	
Japan Apricot	Japan	WG, 30	0.53	0.0075	2	7
Japan pear	Japan	WG, 30	(1.05)	0.015	3	7
Kiwi	New Zealand	SC, 48		0.0096	2	pre-flowering app.
Loganberry	Netherlands	SC, 48	0.14	0.012	2	3
Maize	Belize	SE, 11	0.1	(0.02)		21
Maize	Costa Rica	SE, 11	0.1	(0.02)		21
Maize	Dom. Republic	SE, 11	0.1	(0.02)		21
Maize	El Salvador	SE, 11	0.1	(0.02)		21
Maize	Guatemala	SE, 11	0.1	(0.02)		21
Maize	Honduras	SE, 11	0.1	(0.02)		21
Maize	Nicaragua	SE, 11	0.1	(0.02)		21
Maize	Panama	SE, 11	0.1	(0.02)		21
Maize	Romania	SC, 48	0.048	0.012 - 0.016	1	
Mandarin	Croatia	SC, 48		0.038	2	21
Mandarin	Peru	SC, 48		0.014 - 0.024	1	
Marrow	Spain	SC, 48		0.0067	3	3
Melon	Belize	SC, 10	0.1	(0.02)		21
Melon	Brazil	SC, 48	0.096	0.0048		7
Melon	Costa Rica	SC, 10	0.1	(0.02)		21
Melon	Croatia	SC, 48	0.14		2	4
Melon	Dom. Republic	SC, 10	0.1	(0.02)		21
Melon	El Salvador	SC, 10	0.1	(0.02)		21
Melon	Greece	SC, 48	0.21	0.014	2	3
Melon	Guatemala	SC, 10	0.1	(0.02)		21
Melon	Honduras	SC, 10	0.1	(0.02)		21
Melon	Israel	SC, 48	0.19	0.026 - 0.128	2	10
Melon	Italy	SC, 48	0.14	0.014	2	3
Melon	Japan	WG, 30	0.45	0.015	3	1
Melon	Kenya	SC, 48	0.19	0.019	3	3
Melon	Nicaragua	SC, 10	0.1	(0.02)		21
Melon	Panama	SC, 10	0.1	(0.02)		21
Melon	Spain	SC, 48	0.14	0.0067	3	3
Mirabelle	United Kingdom	SC, 48	0.15	0.015	2	14
Nectarine	Argentina	SC, 48		0.0096	2	14
Nectarine	Australia	SC, 48	0.27	0.018	3	14
Nectarine	Chile	SC, 48		0.0096	2	1
Nectarine	Cyprus	SC, 48		0.0096	2	14
Nectarine	Greece	SC, 48	0.108	0.0072	2	14
Nectarine	Israel	SC, 48	0.2	0.01	1	30
Nectarine	South Africa	SC, 48		0.0034	3	60
Nectarine	Spain	SC, 48		0.014	2	14
Oats	Romania	SC, 48	0.048	0.012 - 0.016	1	
Oilseed rape	Czech Republic	SC, 48	0.096	0.016 - 0.048	2	
Oilseed rape	Hungary	SC, 48	0.048	0.012 - 0.018		30
Oilseed rape	Romania	SC, 48	0.048	0.012 - 0.018	1	
Oilseed rape	Slovakia	SC, 48	0.096			
Oilseed rape	Switzerland	SC, 48	0.096		2	21
Oilseed rape	United Kingdom	OD, 24	0.14	0.035 - 0.07	1	30
Onion	Belize	SC, 10	0.1	(0.02)		21
Onion	Brazil	SC, 48	(0.077)	0.0096		21
Onion	Costa Rica	SC, 10	0.1	(0.02)		21
Onion	Dom. Republic	SC, 10	0.1	(0.02)		21
Onion	El Salvador	SC, 10	0.1	(0.02)		21

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Onion	Guatemala	SC, 10	0.1	(0.02)		21
Onion	Honduras	SC, 10	0.1	(0.02)		21
Onion	Nicaragua	SC, 10	0.1	(0.02)		21
Onion	Panama	SC, 10	0.1	(0.02)		21
Orange	Croatia	SC, 48		0.038	2	21
Paddy rice	India	SC, 24	0.12	0.024		30
Peach	Argentina	SC, 48		0.0096	2	14
Peach	Australia	SC, 48	0.27	0.018	3	21
Peach	Chile	SC, 48		0.0096	2	1
Peach	Croatia	SC, 48	0.096	0.0048	2	21
Peach	Cyprus	SC, 48		0.0096	2	14
Peach	Germany	SC, 48	0.048 per m canopy height	0.0032	1	21
Peach	Greece	SC, 48	0.108	0.0072	2	14
Peach	Israel	SC, 48	0.2	0.01	1	30
Peach	Italy	SC, 48	0.18	0.012		14
Peach	Japan	WG, 30	(1.05)	0.015	3	7
Peach	Slovenia	SC, 48	0.18	0.012	2	14
Peach	South Africa	SC, 48		0.0034	3	60
Peach	South Korea	SC, 10		0.0005	3	14
Peach	Spain	SC, 48		0.014	2	14
Peach	Turkey	SC, 48		0.0096		14
Pear	Argentina	SC, 48	0.072 – 0.084 kg ai/m canopy height	0.004 - 0.006 per m canopy height	2	14
Pear	Belgium	SC, 48	0.06 per m canopy height	0.004 - 0.006 per m canopy height	2	14
Pear	Chile	SC, 48		0.0096	2	1
Pear	Estonia	SC, 48	0.072 - 0.096	0.00960 - 0.019	1	14
Pear	Greece	SC, 48	0.096 - 0.18	0.0096 - 0.012	2	14
Pear	Italy	SC, 48	0.18	0.012	2	14
Pear	Japan	WG, 30	1.05	0.015	3	7
Pear	Latvia	SC, 48		0.072 - 0.096	2	14
Pear	Netherlands	SC, 48	0.12	0.12	2	14
Pear	Portugal	SC, 48	0.096	0.0096	2	14
Pear	South Africa	SC, 48		0.0072	4	14
Pear	South Korea	SC, 10		0.0005	5	21
Pear	Spain	SC, 48	(0.18)	0.0096	2	14
Pepper	Belize	SC, 10	0.1	(0.02)		21
Pepper	Brazil	SC, 48	0.096	0.0096		7
Pepper	Costa Rica	SC, 10	0.1	(0.02)		21
Pepper	Croatia	SC, 48	0.14	0.014	2	7
Pepper	Cyprus	SC, 48		0.014	3	3
Pepper	Dom. Republic	SC, 10	0.1	(0.02)		21
Pepper	El Salvador	SC, 10	0.1	(0.02)		21
Pepper	Greece	SC, 48	0.216	0.014	2	3
Pepper	Guatemala	SC, 10	0.1	(0.02)		21
Pepper	Honduras	SC, 10	0.1	(0.02)		21
Pepper	Italy	SC, 48	0.14	0.014		3
Pepper	Kenya	SC, 48	0.19	0.019	3	3
Pepper	Netherlands (greenhouse use)	SC, 48	0.12	0.012	4	1
Pepper	Netherlands (greenhouse use, drip irrigation)	SC, 48	0.0096 kg ai per 1000 plants		1	3
Pepper	Nicaragua	SC, 10	0.1	(0.02)		21
Pepper	Panama	SC, 10	0.1	(0.02)		21
Pepper	Slovakia	Sc, 48		0.014		3
Pepper	Slovenia	SC, 48	0.21	0.014	2	3
Pepper	Spain	SC, 48		0.014	3	3
Pepper	United Kingdom	SC, 48	0.22	max. 0.022	3	3
Pistachio	Turkey	SC, 48		0.012		21

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Plum	Argentina	SC, 48		0.0096	2	14
Plum	Australia	SC, 48	0.27	0.018	3	14
Plum	Chile	SC, 48		0.0096	2	1
Plum	Croatia	SC, 48	0.096	0.0048	2	14
Plum	Czech Republic	SC, 48	0.12	0.012	2	14
Plum	Germany	SC, 48	0.048 per m canopy height	0.0032	2	14
Plum	Japan	WG, 30	0.53	0.0075	3	7
Plum	Netherlands	SC, 48	0.12	0.012	2	14
Plum	Poland	SC, 48	0.096	0.013 - 0.019	1	14
Plum	Romania	SC, 48	0.096	0.0096	2	14
Plum	Slovakia	SC, 48	0.096			14
Plum	United Kingdom	SC, 48	0.144	0.014	3	14
Pome fruit	Australia	SC, 48	0.27	0.018	3	14
Pome fruit	Austria	SC, 48		0.01 – 0.012	1-2	14
Pome fruit	Germany	SC, 48	0.048 per m canopy height		2	14
Pome fruit	Switzerland	SC, 48	(0.19)	0.0192	2	21
Pome fruit	USA	SC, 40	0.28	0.01	6	30
Potato	Argentina	SC, 48	0.072		min. 1	7
Potato	Austria	SC, 48	0.096	0.019 - 0.048	2	21
Potato	Belize	SC, 10	0.1	(0.02)		21
Potato	Brazil	SC, 48	0.048			21
Potato	Costa Rica	SC, 10	0.1	(0.02)		21
Potato	Croatia	SC, 48	0.048		2	14
Potato	Cyprus	SC, 48		0.0096	1	21
Potato	Czech Republic	SC, 48	0.048	0.0096 - 0.016	2	21
Potato	Dom. Republic	SC, 10	0.1	(0.02)		21
Potato	El Salvador	SC, 10	0.1	(0.02)		21
Potato	Estonia	SC, 48	0.048	0.096 - 0.024	1	21
Potato	Georgia	SC, 48	0.04			
Potato	Greece	SC, 48	0.072	0.005 - 0.014	2	21
Potato	Guatemala	SC, 10	0.1	0(0.02)		21
Potato	Honduras	SC, 10	0.1	(0.02)		21
Potato	Hungary	SC, 48	0.048	0.012		7
Potato	Israel	SC, 48	0.096	0.0048 - 0.0096	1	21
Potato	Japan	WG, 30	(0.23)	0.0075	3	7
Potato	Latvia	SC, 48	0.048		3	21
Potato	Lithuania	SC, 48	0.024 – 0.048	0.006 – 0.024	3	21
Potato	Mexico	SC, 48	0.096			7
Potato	Netherlands	SC, 48	0.12		3	14
Potato	Nicaragua	SC, 10	0.1	(0.02)		21
Potato	Panama	SC, 10	0.1	(0.02)		21
Potato	Poland	SC, 48	0.048	0.012	1	3
Potato	Portugal	SC, 48	0.072	0.009	2	21
Potato	Romania	SC, 48	0.077		2	
Potato	Slovakia	SC, 48	0.048	0.012	2	14
Potato	Slovenia	SC, 48	0.048	(0.006 - 0.0096)	2	21
Potato	South Korea	SC, 10		0.00075	3	21
Potato	Spain	SC, 48	0.096		3	21
Potato	Switzerland	SC, 48	0.048		3	21
Potato (seed)	United Kingdom	OD, 24	0.096	0.024 – 0.048	2	14
Potato (ware)	United Kingdom	OD, 24	0.096	0.024 – 0.048	1	14
Raspberry	Germany	SC, 48	0.096	0.0096	2	14
Raspberry	Netherlands	SC, 48	0.14	0.012	2	3
Raspberry and rubus hybrids	United Kingdom	SC, 48	0.12	0.024	3	3
Red currants	Latvia	SC, 48	0.072	(0.019)	2	14
Red Pepper	South Korea	SC, 10		0.0005	3	3
Rice	Belize	SE, 11	0.1	(0.02)		21
Rice	Costa Rica	SE, 11	0.1	(0.02)		21
Rice	Dom. Republic	SE, 11	0.1	(0.02)		21

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Rice	El Salvador	SE, 11	0.1	(0.02)		21
Rice	Guatemala	SE, 11	0.1	(0.02)		21
Rice	Honduras	SE, 11	0.1	(0.02)		21
Rice	Indonesia	SC, 24	0.14	0.028		
Rice	Nicaragua	SE, 11	0.1	(0.02)		21
Rice	Panama	SE, 11	0.1	(0.02)		21
Rice	South Korea	GR, 1	0.5 g/box		1	
Rice	Thailand	SC, 24		0.018		14
Rice (nursery box)	Japan	GR, 1,5	50 g/box = 0.15 kg ai/ha		1	
Squash	Cyprus (field and greenhouse use)	SC, 48		0.014	3	3
Squash	Netherlands	SC, 48		0.012	4	1
Stone fruit	Argentina	SC, 48		0.0096	2	14
Stone fruit	Australia	SC, 48	0.27	0.018	3	14
Stone fruit	Chile	SC, 48		0.0096	2	1
Stone fruit	Czech Republic	SC, 48	0.096	0.0096	2	14
Stone fruit	Switzerland	SC, 48		0.0058	2	21
Stone fruit	Tunisia	SC, 48		0.0096		30
Strawberry	Japan	WG, 30	0.23	0.0075	3	1
Strawberry	Latvia	SC, 48	0.096	(0.024)	2	14
Strawberry	Netherlands	SC, 48	0.14	0.012	2	3
Strawberry	Netherlands (greenhouse use)	SC, 48	0.14	0.012	2	1
Strawberry	United Kingdom	Sc, 48	0.12	0.024	2	3
Strawberry	United Kingdom (greenhouse use)	Sc, 48	0.12	0.024	2	3
Sunflower	Hungary	SC, 48	0.036	0.008 - 0.012		30
Sunflower	Slovakia	SC, 48	0.048			
Sweet Corn	Israel	SC, 48	0.096	0.013 - 0.064	2	3
Sweet Pepper	Japan	WG, 30	0.23	0.0075	3	1
Sweet Pepper	Tunisia	SC, 48		0.014	2	3
Tayberry	Netherlands	SC, 48	0.14	0.012	2	3
Tea	Japan	WG, 30	0.6	0.015	1	7
Tomato	Argentina	SC, 48	0.144		min. 1	3
Tomato	Belize	SC, 10	0.1	(0.02)		21
Tomato	Brazil	SC, 48	0.096	(0.0096)		7
Tomato	Costa Rica	SC, 10	0.1	(0.02)		21
Tomato	Croatia	SC, 48	0.14	0.014	2	4
Tomato	Cyprus	SC, 48		0.014	3	3
Tomato	Dom. Republic	SC, 10	0.1	(0.02)		21
Tomato	El Salvador	SC, 10	0.1	(0.02)		21
Tomato	Greece	SC, 48	0.216	0.014	2	3
Tomato	Guatemala	SC, 10	0.1	(0.02)		21
Tomato	Honduras	SC, 10	0.1	(0.02)		21
Tomato	Israel	SC, 48	0.192			3
Tomato	Italy	SC, 48	0.14	0.014		3
Tomato	Japan	WG, 30	0.23	0.015	3	1
Tomato	Kenya	SC, 48	0.19	(0.019)	4	3
Tomato	Morocco	SC, 48		0.014		3
Tomato	Netherlands (greenhouse use)	SC, 48	0.12	0.012	4	1
Tomato	Netherlands (greenhouse use, drip irrigation)	SC, 48	0.0096 kg ai per 1000 plants		1	3
Tomato	Nicaragua	SC, 10	0.1	(0.02)		21
Tomato	Panama	SC, 10	0.1	(0.02)		21
Tomato	Peru	SC, 48		0.036		3
Tomato	Slovakia	SC, 48		0.014		3
Tomato	Slovenia	SC, 48	0.21	0.014	2	3
Tomato	Spain	SC, 48		0.014	3	3
Tomato	Tunisia	SC, 48		0.014	2	3

Crop	Country	Formulation, ai %	Application rate		No. Per season	PHI (days)
			kg ai/ha	kg ai/hL		
Tomato	Turkey	SC, 48		0.0096		3
Tomato	United Kingdom	SC, 48	0.22	max. 0.022	3	3
Tree nuts	Italy	SC, 48	0.18	0.012		14
Walnut	Argentina	SC, 48		0.0096	2	21
Walnut	Chile	SC, 48		0.0096	2	1
Walnut	Italy	SC, 48	0.18	0.012		14
Walnut	United Kingdom	SC, 48	0.18	0.018	2	
Watermelon	Belize	SC, 10	0.1	(0.02)		21
Watermelon	Brazil	Sc, 48	0.096			21
Watermelon	Costa Rica	SC, 10	0.1	(0.02)		21
Watermelon	Cyprus	SC, 48		0.014	3	3
Watermelon	Dom. Republic	SC, 10	0.1	(0.02)		21
Watermelon	El Salvador	SC, 10	0.1	(0.02)		21
Watermelon	Guatemala	SC, 10	0.1	(0.02)		21
Watermelon	Honduras	SC, 10	0.1	(0.02)		21
Watermelon	Japan	WG, 30	0.45	0.0075	3	1
Watermelon	Kenya	SC, 48	0.19	0.019	3	3
Watermelon	Nicaragua	SC, 10	0.1	(0.02)		21
Watermelon	Panama	SC, 10	0.1	(0.02)		21
Watermelon	South Korea	SC, 10		0.0005	3	3
Watermelon	Spain	SC, 48	0.14	0.0067	3	3
Wheat	Romania	SC, 48	0.048	0.012 - 0.016	1	
White mustard	Czech Republic	SC, 48	0.096	0.016 - 0.048	2	
Winter wheat	Lithuania	SC, 48	0.034		3	21
Wintersquash	Israel	SC, 48	0.19	0.026 - 0.128	2	10

Values in parenthesis are calculated from the spray volume

## RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The Meeting received information on thiacloprid supervised trials on the following crops (Table 26).

Trials were well documented with laboratory and field reports. The former included method validation including procedural recoveries with spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analysis or duration of sample storage were also provided. Although trials included control plots, no control data are recorded in the Tables because no residues in control samples exceeded the LOQ. Residues are unadjusted for recoveries.

When residues were not detected they are shown as below the LOQ (e.g. < 0.01 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. Residues from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. These results are double underlined.

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

Table 26. Overview of supervised residue trials.

Commodity	Application	Country	Table no.
Citrus	Foliar	Brazil, New Zealand, South Africa	Table 27
Apple	Foliar	Australia, Belgium, France, Germany, Italy, Japan, Netherlands, South Africa, Spain, United Kingdom, USA	Table 28
Pear	Foliar	Australia, Japan, South Africa, USA	Table 29
Apricot, Japanese	Foliar	Japan	Table 30
Peach	Foliar	France, Italy, Japan, Spain	Table 31
Cherry	Foliar	Belgium, France, Germany, Italy, Japan, Spain, USA	Table 32
Plum	Foliar	France, Germany, Japan, Spain, USA	Table 33

Grapes	Foliar (glasshouse use)	Japan	Table 34
Strawberries	Foliar (field use)	Belgium, France, Germany, United Kingdom	Table 35
Strawberries	Foliar (greenhouse use)	France, Germany, Italy, Japan, Netherlands, Spain	Table 36
Currants	Foliar	Belgium, Germany, United Kingdom	Table 37
Raspberries	Foliar	Germany, United Kingdom	Table 38
Kiwi fruits	Foliar	New Zealand	Table 39
Onions	Foliar	Brazil, Germany	Table 40
Garlic	Foliar	Brazil	Table 41
Eggplants	Foliar (glasshouse use)	Japan	Table 42
Cucumbers	Foliar (field use)	Germany, Italy, Spain	Table 43
Cucumbers	Foliar (greenhouse use)	Belgium, France, Germany, Greece, Italy, Netherlands, Spain	Table 44
Melons	Foliar (field use)	France, Greece, Italy	Table 45
Melons	Foliar (glasshouse use)	Japan	Table 46
Watermelons	Foliar (field use)	Greece, Spain	Table 47
Watermelons	Foliar (glasshouse use)	Japan	Table 48
Tomato	Foliar (field use)	France, Italy	Table 49
Tomato	Foliar (greenhouse use)	France, Germany, Japan, Spain	Table 50
Tomato	Drip application (greenhouse use)	Belgium, Netherlands	Table 51
Pepper	Foliar (field use)	France, Italy, Spain	Table 52
Pepper	Foliar (greenhouse use)	France, Netherlands, Japan, Spain	Table 53
Pepper	Drip application (greenhouse use)	Belgium, Netherlands	Table 54
Potato	Foliar	Belgium, Brazil, France, Germany, Italy, Japan, Spain, United Kingdom	Table 55
Wheat	Foliar	France, Germany	Table 56
Barley	Foliar	France, Germany	Table 57
Rice	Foliar	India	Table 58
Rice	Granular	Japan	Table 59
Maize	Foliar	France, Germany, Greece, Italy, Spain	Table 60
Walnuts	Foliar	Italy	Table 61
Almonds	Foliar	USA	Table 62
Pecan	Foliar	USA	Table 63
Oilseed rape	Foliar	France, Germany, Hungary, Spain, Sweden	Table 64
Cotton	Foliar	Greece, Spain, USA	Table 65 <sup>1</sup>
Sunflowers	Foliar	Hungary	Table 66
Green tea	Foliar	Japan	Table 67

<sup>1</sup> Single underlined values were used for the evaluation of rape forage. Double underlined values were used for the evaluation of rape seed and white mustard.

### *Citrus fruits*

Table 27. Thiacloprid residues resulting from foliar application to citrus.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Brazil, Riberao Preto/SP	1998	480 SC	0.096	0.0048	3	Lemon, peel Lemon, pulp	21 21	0.02 < 0.02	Lancas, F. M. 1998, 1998a M-005338-01-2 and M-005340-01-2
Brazil, Riberao Preto/SP	1998	480 SC	0.19	0.0096	3	Lemon, peel Lemon, pulp	21 21	0.06 0.04	Lancas, F. M. 1998, 1998a M-005338-01-2 and M-005340-01-2

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
New Zealand Kerikeri	2002 (Yen Ben)	480 SC	0.19	0.0096	1	Lemon, whole fruit	1 3 5 7 10 14	0.19 0.2 0.1 0.14 0.15 0.07	Clay, S. 2002 M-261169-01-1
South Africa Vaalwater, Northern Province	1999 (Navel)	480 SC	0.00043	0.014	1	Orange, whole fruit Orange, peel  Orange, pulp	44 93 123 151 190 93 123 151 190	< 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Zyl, P. F. C. van 2000a M-048686-02-1
South Africa Vaalwater, Northern Province	1999 (Navel)	480 SC	0.00086	0.029	1	Orange, whole fruit Orange, peel  Orange, pulp	44 93 123 151 190 93 123 151 190	< 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Zyl, P. F. C. van 2000a M-048686-02-1

### Pome fruits

Table 28. Thiacloprid residues resulting from foliar application to apples.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
United Kingdom Thurston	1995 (Gloster 69)	480 SC	0.14 – 0.15	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 22	< 0.02 0.03 0.05 0.03 <u>0.04</u> 0.04	Placke, F. J. 1997a RA-2062/95
Belgium Kortenaken	1995 (Jonagold)	480 SC	0.14 – 0.15	0.0096	2	Fruit	0 <sup>1</sup> 0 7 14 21	0.04 0.18 0.17 <u>0.12</u> 0.09	Placke, F. J. 1997a RA-2062/95
Germany Burscheid	1995 (Jonagold)	480 SC	0.14	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.04 0.16 0.09 0.06 <u>0.07</u> 0.04	Placke, F. J. 1997a RA-2062/95
Germany Monheim	1995 (Golden Delicious)	480 SC	0.14	0.029	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.04 0.25 < 0.02 0.09 0.07 0.05	Placke, F. J. 1997a RA-2062/95
United Kingdom Bury St. Edmunds	1996 (Golden Delicious)	480 SC	0.18	0.012	2	Fruit	0 14	0.26, 0.28 (0.27) 0.15, 0.16 ( <u>0.16</u> )	Placke, F. J. 1997b RA-2114/96

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Netherlands Kruisland 1996 (Jonagold)		480 SC	0.18	0.012	2	Fruit	0 14	0.11 <u>0.05</u>	Placke, F. J. 1997b RA-2114/96
Germany Burscheid 1996 (Elstar)		480 SC	0.18	0.012	2	Fruit	0 13	0.23 <u>0.11</u>	Placke, F. J. 1997b RA-2114/96
Germany Monheim 1996 (Golden Delicious)		480 SC	0.14	0.036	2	Fruit	0 14	0.23 0.11	Placke, F. J. 1997b RA-2114/96
France Bossay 2000 (Reine des Reinettes)		480 SC	0.18	0.012	2	Fruit	0 14	0.19 <u>0.21</u>	Schoening, R. 2001a M-080245-01-1
France Azay le Rideau 2000 (Golden)		480 SC	0.18	0.012	2	Fruit	0 14	0.11 <u>0.1</u>	Schoening, R. 2001a M-080245-01-1
Spain Pere Pescador 1995 (Starking)		480 SC	0.14	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.05 0.15 0.11 0.09 <u>0.08</u> 0.07	Placke, F. J. 1997c M-000919-01-1
Italy Laives 1995 (Golden Delicious)		480 SC	0.14	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.03 0.15 0.03 0.03 <u>0.02</u> 0.02	Placke, F. J. 1997c M-000919-01-1
Italy Laives 1995 (Granny Smith)		480 SC	0.14	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.02 0.12 0.13 0.15 <u>0.1</u> 0.08	Placke, F. J. 1997c M-000919-01-1
Spain Pere Pescador 1995 (Golden)		480 SC	0.14	0.0096	2	Fruit	0 <sup>1</sup> 0 7 10 14 21	0.05 0.15 0.13 0.13 <u>0.11</u> 0.1	Placke, F. J. 1997c M-000919-01-1
Spain Pere Pescador 1995 (Suprema)		480 SC	0.18	0.012	2	Fruit	0 14	0.19 <u>0.14</u>	Placke, F. J. 1997d M-000913-01-1
Italy Pineta di Laives 1996 (Stark Delicious)		480 SC	0.18	0.012	2	Fruit	0 14	0.14 <u>0.1</u>	Placke, F. J. 1997d M-000913-01-1
Italy Montemarzino 1996 (Golden)		480 SC	0.18	0.012	2	Fruit	0 14	0.48 <u>0.36</u>	Placke, F. J. 1997d M-000913-01-1
France Roches-Prémarie- Andillé 1996 (Golden)		480 SC	0.18	0.012	2	Fruit	0 14	0.22 <u>0.04</u>	Placke, F. J. 1997d M-000913-01-1

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
France Mas Grenier 2000 (Golden)		480 SC	0.18	0.012	2	Fruit	0 14	0.3 <u>0.13</u>	Schoening, R. 2001b M-075119-01-1
USA Pennsylvania 1998 (Starkrimson Red Delicious)		480 SC	0.28	0.046	2	Fruit	29 46	0.06 0.07	Harbin, A.M. 1999 M-009903-01-1
USA Pennsylvania 1998 (Starkrimson Red Delicious)		480 SC	0.28	0.0098	2	Fruit	29 46	<u>0.11</u> 0.08	Harbin, A.M. 1999 M-009903-01-1
USA New York 1998 (Red Delicious)		480 SC	0.28	0.037	2	Fruit	30 44	0.11 0.05	Harbin, A.M. 1999 M-009903-01-1
USA New York 1998 (Red Delicious)		480 SC	0.28	0.0075	2	Fruit	30 44	<u>0.096</u> 0.05	Harbin, A.M. 1999 M-009903-01-1
USA Pennsylvania 1998 (Law Rome/MM111)		480 SC	0.28	0.048	2	Fruit	30 45	0.03 0.02	Harbin, A.M. 1999 M-009903-01-1
USA Pennsylvania 1998 (Law Rome/MM111)		480 SC	0.28	0.0085	2	Fruit	30 45	<u>0.04</u> 0.03	Harbin, A.M. 1999 M-009903-01-1
USA North Carolina 1998 (Red Delicious)		480 SC	0.28	0.06	2	Fruit	31 45	0.02 0.02	Harbin, A.M. 1999 M-009903-01-1
USA North Carolina 1998 (Red Delicious)		480 SC	0.28	0.0081	2	Fruit	31 45	<u>0.06</u> 0.04	Harbin, A.M. 1999 M-009903-01-1
USA Illinois 1998 (Jonathon)		480 SC	0.28	0.043	2	Fruit	30 45	0.06 0.06	Harbin, A.M. 1999 M-009903-01-1
USA Illinois 1998 (Jonathon)		480 SC	0.28	0.0078	2	Fruit	30 45	<u>0.07</u> 0.03	Harbin, A.M. 1999 M-009903-01-1
USA Utah 1998 (Red Delicious)		480 SC	0.28	0.047	2	Fruit	29 47	0.04 0.01	Harbin, A.M. 1999 M-009903-01-1
USA Utah 1998 (Red Delicious)		480 SC	0.28	0.0074	2	Fruit	29 47	<u>0.02</u> 0.01	Harbin, A.M. 1999 M-009903-01-1
USA Idaho 1998 (Law Spur Rome)		480 SC	0.28	0.034	2	Fruit	30 45	0.03 0.02	Harbin, A.M. 1999 M-009903-01-1

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA Idaho 1998 (Law Spur Rome)		480 SC	0.28	0.0078	2	Fruit	30 45	<u>0.06</u> 0.04	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Jonagold)		480 SC	0.28	0.033	2	Fruit	30 46	0.07 0.02	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Jonagold)		480 SC	0.28	0.0073	2	Fruit	30 46	<u>0.28</u> 0.04	Harbin, A.M. 1999 M-009903-01-1
USA Washington 1998 (Red Delicious)		480 SC	0.28	0.041	2	Fruit	30 45	0.13 0.04	Harbin, A.M. 1999 M-009903-01-1
USA Washington 1998 (Red Delicious)		480 SC	0.28	0.0077	2	Fruit	30 45	<u>0.14</u> 0.05	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Fuji Apple)		480 SC	0.28	0.04	2	Fruit	23 30 37 44 52	0.05 0.03 0.03 0.02 0.03	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Fuji Apple)		480 SC	0.28	0.007	2	Fruit	23 30 37 44 52	0.09 <u>0.09</u> 0.03 0.03 0.07	Harbin, A.M. 1999 M-009903-01-1
USA California 1998 (Rome Beauty)		480 SC	0.28	0.038	2	Fruit	25 32 39 46 53	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01	Harbin, A.M. 1999 M-009903-01-1
USA California 1998 (Rome Beauty)		480 SC	0.28	0.007	2	Fruit	25 32 39 46 53	0.02 0.02 <u>0.06</u> 0.02 0.05	Harbin, A.M. 1999 M-009903-01-1
USA Kansas 1998 (Golden Delicious)		480 SC	0.28	0.048	2	Fruit	41	< 0.01	Harbin, A.M. 1999 M-009903-01-1
USA Kansas 1998 (Golden Delicious)		480 SC	0.28	0.0082	2	Fruit	41	0.05	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Fuji Apples)		70 WG	0.28	0.04	2	Fruit	23 30 37 44 52	0.08 0.04 0.02 0.05 0.03	Harbin, A.M. 1999 M-009903-01-1
USA Oregon 1998 (Fuji Apples)		70 WG	0.28	0.007	2	Fruit	23 30 37 44 52	0.097 <u>0.07</u> 0.02 0.03 0.03	Harbin, A.M. 1999 M-009903-01-1

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA California 1998 (Rome Beauty)	70 WG	0.08	0.038	2	Fruit	25	< 0.01	Harbin, A.M. 1999 M-009903-01-1	
						32	< 0.01		
						39	< 0.01		
						46	< 0.01		
						53	< 0.01		
USA California 1998 (Rome Beauty)	70 WG	0.08	0.007	2	Fruit	25	0.02	Harbin, A.M. 1999 M-009903-01-1	
						32	0.03		
						39	0.02		
						46	0.01		
						53	<u>0.05</u>		
USA Pennsylvania 1998 (Starkrimson Red Delicious)	70 WG	0.28	0.046	2	Fruit	29	0.07	Harbin, A.M. 1999 M-009903-01-1	
						46	0.08		
USA Pennsylvania 1998 (Starkrimson Red Delicious)	70 WG	0.28	0.0098	2	Fruit	29	<u>0.09</u>	Harbin, A.M. 1999 M-009903-01-1	
						46	0.09		
South Africa Villiersdorp 2000 (Golden Delicious)	480 SC	0.24	0.0096	4	Fruit	0 <sup>1</sup>	0.32, 0.31 (0.32)	Zyl, P. F. C. van 2000b 5438/1493281/T392	
						0	0.68, 0.67 (0.68)		
						14	0.54, 0.54 (0.54)		
South Africa Villiersdorp 2000 (Granny Smith)	480 SC	0.24	0.0096	4	Fruit	0 <sup>1</sup>	0.23, 0.26 (0.25)	Zyl, P. F. C. van 2000c 5438/1493257/T389	
						0	0.73, 0.76 (0.75)		
						14	0.43, 0.43 (0.43)		
South Africa Villiersdorp 2000 (Royal Galaxy)	480 SC	0.19	0.0096	4	Fruit	0 <sup>1</sup>	0.06, 0.06 (0.06)	Garbers, H. V. 2000 5438/1493265/T390	
						0	0.48, 0.45 (0.47)		
						14	0.15, 0.14 (0.15)		
South Africa Villiersdorp 2000 (Royal Galaxy)	480 SC	0.38	0.019	4	Fruit	0 <sup>1</sup>	0.12, 0.13 (0.13)	Garbers, H. V. 2000 5438/1493265/T390	
						0	0.51, 0.71 (0.61)		
						14	0.60, 0.51 (0.56)		
Australia Applethorpe 1998 (Granny Smith)	480 SC	0.24	0.018	10	Fruit	0	0.28, 0.55 (0.42)	Tancred, S. 1999 EMH453/99	
						7	0.21, 0.21 (0.21)		
						14	0.50, 0.23 <u>(0.37)</u>		
						21	0.30, 0.31 (0.31)		
						0	0.70, 0.44 (0.57)		
						7	0.44, 0.38 (0.41)		
						14	0.25, 0.31 (0.28)		
21	0.25, 0.32 (0.29)								
					Replicate trial Fruit				

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Iwate  1996 (Fuji)		WG, 30	0.6	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 1997, 1997a, 1997b, 1997c
							7	0.30, 0.28, 0.30 <sup>2</sup> , 0.30 <sup>2</sup> ( 0.30)	
							15	0.33, 0.29, 0.27 <sup>2</sup> , 0.26 <sup>2</sup> ( 0.29)	
							22	0.26, 0.25, 0.28 <sup>2</sup> , 0.27 <sup>2</sup> ( 0.27)	
						Thiacloprid/amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
							15	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
							22	< 0.005, < 0.005, 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
Japan, Nagano  1996 (Tugaru)		WG, 30	0.6	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 1997, 1997a, 1997b, 1997c
							7	0.09, 0.09, 0.13 <sup>2</sup> , 0.13 <sup>2</sup> ( 0.11)	
							15	0.05, 0.04, 0.05 <sup>2</sup> , 0.05 <sup>2</sup> ( 0.05)	
							22	0.06, 0.06, 0.06 <sup>2</sup> , 0.06 <sup>2</sup> ( 0.06)	
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	
							15	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							22	< 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		

1) sampling before last application

2) replicate analysis

Table 29. Thiacloprid residues resulting from foliar application to pears.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
USA Pennsylvania 1998 (Bartlett)		480 SC	0.28	0.039	2	Fruit	31 45	0.06 0.08	Harbin, A.M. 1999 M-009903-01-1	
USA Pennsylvania 1998 (Bartlett)		480 SC	0.28	0.0097	2	Fruit	31 45	0.13 <u>0.14</u>	Harbin, A.M. 1999 M-009903-01-1	
USA California 1998 (Bartlett)		480 SC	0.28	0.031	2	Fruit	29 44	0.25 0.21	Harbin, A.M. 1999 M-009903-01-1	
USA California 1998 (Bartlett)		480 SC	0.28	0.0099	2	Fruit	29 44	<u>0.23</u> 0.13	Harbin, A.M. 1999 M-009903-01-1	
USA California 1998 (Bosc)		480 SC	0.28	0.032	2	Fruit	30 44	0.21 0.26	Harbin, A.M. 1999 M-009903-01-1	
USA California 1998 (Bosc)		480 SC	0.28	0.0094	2	Fruit	30 44	<u>0.27</u> 0.12	Harbin, A.M. 1999 M-009903-01-1	
USA Idaho 1998 (Max Red Bartlett)		480 SC	0.28	0.033	2	Fruit	22 29 36 43 50	0.06 0.05 0.05 0.03 0.03	Harbin, A.M. 1999 M-009903-01-1	
USA Idaho 1998 (Max Red Bartlett)		480 SC	0.28	0.01	2	Fruit	22 29 36 43 50	0.08 <u>0.06</u> 0.06 0.04 0.05	Harbin, A.M. 1999 M-009903-01-1	
USA Oregon 1998 (Red Clapp)		480 SC	0.28	0.033	2	Fruit	30 45	0.04 0.03	Harbin, A.M. 1999 M-009903-01-1	
USA Oregon 1998 (Red Clapp)		480 SC	0.28	0.01	2	Fruit	30 45	<u>0.05</u> 0.04	Harbin, A.M. 1999 M-009903-01-1	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA Washington 1998 (Red Bartlett)		480 SC	0.28	0.033	2	Fruit	30 45	0.18 0.14	Harbin, A.M. 1999 M-009903-01-1
USA Washington 1998 (Red Bartlett)		480 SC	0.28	0.01	2	Fruit	30 45	<u>0.24</u> 0.15	Harbin, A.M. 1999 M-009903-01-1
USA Sacramento 1998 (Bartlett)		70 WG	0.28	0.031	2	Fruit	29 44	0.22 0.17	Harbin, A.M. 1999 M-009903-01-1
USA Sacramento 1998 (Bartlett)		70 WG	0.28	0.0099	2	Fruit	29 44	<u>0.14</u> 0.13	Harbin, A.M. 1999 M-009903-01-1
USA Idaho 1998 (Max Red Bartlett)		70 WG	0.28	0.033	2	Fruit	22 29 36 43 50	0.06 0.05 0.08 0.02 0.02	Harbin, A.M. 1999 M-009903-01-1
USA Idaho 1998 (Max Red Bartlett)		70 WG	0.28	0.01	2	Fruit	22 29 36 43 50	0.11 0.08 0.08 <u>0.10</u> 0.06	Harbin, A.M. 1999 M-009903-01-1
South Africa Groot Drakenstein 2000 (Forelle)		480 SC	0.24	0.0096	4	Fruit	0 <sup>1</sup> 0 14	0.19, 0.21 (0.20) 0.55, 0.48 (0.52) 0.22, 0.21 (0.22)	Zyl, P. F. C. van 2000d 5438/1502352/T465
South Africa Groot Drakenstein 2000 (Forelle)		480 SC	0.31	0.0096	4	Fruit	0 <sup>1</sup> 0 14	0.51, 0.49 (0.50) 0.98, 1.1 (1.04) 0.51, 0.48 (0.50)	Zyl, P. F. C. van 2000e 5438/1502361/T466
South Africa Groot Drakenstein 2000 (Forelle)		480 SC	0.61	0.0192	4	Fruit	0 <sup>1</sup> 0 14	0.85, 0.82 (0.84) 1.4, 1.5 (1.5) 1.1, 1.1 (1.1)	Zyl, P. F. C. van 2000e 5438/1502361/T466
Australia Cottenvale 1999 (Packham)		480 SC	0.35	0.018	8	Fruit	0 <sup>1</sup> 0 7 14 21 28	0.43 0.66 0.30 <u>0.37</u> 0.34 0.29	Tancred, S. 2001 ADM 172/01
Australia Cottenvale 1999 (Packham)		480 SC	0.35	0.018	4	Fruit	0 <sup>1</sup> 0 7 14 21 28	0.41 0.62 0.33 0.26 0.28 <u>0.38</u>	Tancred, S. 2001 ADM 172/01
Japan, Fukushima  1997 (Kousui)		30 WG	0.6	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 1997l, 1997m, 1997n, 1997o

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
						Thiacloprid/amide: Whole Fruit	7	0.67, 0.64, 0.57 <sup>2</sup> , 0.57 <sup>2</sup> (0.61)		
							14	0.45, 0.45, 0.34 <sup>2</sup> , 0.33 (0.39)		
							21	0.31, 0.31, 0.19 <sup>2</sup> , 0.18 <sup>2</sup> (0.25)		
							0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		
							7	0.02, 0.01, 0.01 <sup>2</sup> , 0.01 <sup>2</sup> (0.01)		
							14	0.01, 0.01, 0.01 <sup>2</sup> , 0.01 <sup>2</sup> (0.01)		
							21	0.01, 0.01, 0.01 <sup>2</sup> , 0.01 <sup>2</sup> (0.01)		

1 sampling before last application

2 replicate analysis

### Stone fruits

Table 30. Thiacloprid residues resulting from foliar application to Japanese apricots.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Fukui  1997 (Benisashi)		WG, 30	0.6	0.015	2	Thiacloprid: Whole fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 2001a, 2001b	
							7	1.7, 1.6, 1.3 <sup>2</sup> , 1.3 <sup>2</sup> (1.5)		
							14	0.91, 0.81, 0.81 <sup>2</sup> , 0.77 <sup>2</sup> (0.83)		
							21	0.94, 0.83, 0.69 <sup>2</sup> , 0.66 <sup>2</sup> (0.78)		
						Thiacloprid/amide: Whole Fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		
							7	0.09, 0.08,		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							14	0.06 <sup>2</sup> , 0.06 <sup>2</sup> (0.07)		
							21	0.05, 0.05, 0.03 <sup>2</sup> , 0.02 <sup>2</sup> (0.04)		
								0.04, 0.04, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.03)		
Japan, Wakayama		WG, 30	0.6	0.015	2	Thiacloprid: Whole fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 2001a, 2001b	
1997 (Nanko)							7	1.3, 1.3, 0.96 <sup>2</sup> , 0.94 <sup>2</sup> (1.1)		
							14	1.4, 1.4, 0.80 <sup>2</sup> , 0.79 <sup>2</sup> (1.1)		
							21	0.44, 0.43, 0.28 <sup>2</sup> , 0.27 <sup>2</sup> (0.36)		
						Thiacloprid/amide: Whole Fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		
							7	0.08, 0.07, 0.05 <sup>2</sup> , 0.05 <sup>2</sup> (0.06)		
							14	0.07, 0.05, 0.04 <sup>2</sup> , 0.04 <sup>2</sup> (0.05)		
							21	0.03, 0.03, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.03)		

1 sampling before last application

2 replicate analysis

Table 31. Thiacloprid residues resulting from foliar application to peaches.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
France Eyragues		480 SC	0.11	0.0096	2	Fruit, whole	0	0.13	Schoening, R. 2001c	
2000 (Meryl Gen Free)							14	<u>0.03</u>	RA-2113/00	
Spain La Fortesa		480 SC	0.14	0.0096	2	Fruit, whole	0 <sup>1</sup>	0.13	Placke, F. J. 1997e	
1995 (Fire Red)							0	0.23	RA-2064/95	
							8	0.24		
							10	0.17		
							14	<u>0.13</u>		
							21	0.07		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Spain Gualta  1995 (Baby Gold 5)		480 SC	0.14	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 7 10 14 21	0.05 0.15 0.09 0.10 <u>0.08</u> 0.05	Placke, F. J. 1997e RA-2064/95
Italy Ravenna  1995 (Red Heaven)		480 SC	0.14	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 7 10 14 21	0.02 0.08 0.06 0.04 <u>0.03</u> < 0.02	Placke, F. J. 1997e RA-2064/95
Italy Fondi  1995 (O'Henry)		480 SC	0.14	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 7 10 14 21	0.06 0.24 0.17 0.11 <u>0.06</u> 0.05	Placke, F. J. 1997e RA-2064/95
Spain La Fortesa 1996 (Baby Gold 9)		480 SC	0.14	0.0096	2	Fruit, whole	0 14	0.19 <u>0.09</u>	Placke, F. J. 1997f RA-2121/96
Spain Can Rosell- Subiratt 1996 (Springcrest)		480 SC	0.14	0.0096	2	Fruit, whole	0 14	0.55 <u>0.19</u>	Placke, F. J. 1997f RA-2121/96
Italy Ravenna 1996 (Red Heaven)		480 SC	0.14	0.0096	2	Fruit, whole	0 14	0.10 <u>0.03</u>	Placke, F. J. 1997f RA-2121/96
France Eyragues 1996 (Meryl Gen Free)		480 SC	0.14	0.0096	2	Fruit, whole	0 14	0.18 <u>0.13</u>	Placke, F. J. 1997f RA-2121/96
Japan, Fukushima  1997 (Kawanakajimaha kutou)		30 WG	0.6	0.015	3	Thiacloprid: Whole fruit w/o stone          Thiacloprid-amide: Whole Fruit w/o stone	0 <sup>1</sup>          0 <sup>1</sup>       7       14       21       0 <sup>1</sup>       7       14	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) 0.48, 0.48, 0.24 <sup>2</sup> , 0.24 <sup>2</sup> (0.36) 0.42, 0.40, 0.33 <sup>2</sup> , 0.33 <sup>2</sup> (0.37) 0.43, 0.42, 0.38 <sup>2</sup> , 0.36 <sup>2</sup> (0.40) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) 0.01, 0.01, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (0.01) 0.01, 0.01, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup>	Anon. 1997h, 1997i, 1997j, 1997k

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							21	(0.01) 0.01, 0.01, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (0.01)		
Japan, Wakayama  1997 (Takeihakuhou)	30 WG	0.6	0.015	3	Thiacloprid: Whole fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 1997h, 1997i, 1997j, 1997k		
						7	0.31, 0.30, 0.23 <sup>2</sup> , 0.22 <sup>2</sup> (0.27)			
						14	0.1, 0.1, 0.14 <sup>2</sup> , 0.14 <sup>2</sup> (0.12)			
						21	0.07, 0.06, 0.09 <sup>2</sup> , 0.09 <sup>2</sup> (0.08)			
					Thiacloprid-amide: Whole Fruit w/o stone	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)			
						7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)			
						14	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)			
						21	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)			

1 sampling before last application

2 replicate analysis

Table 32. Thiacloprid residues resulting from foliar application to cherries.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Belgium Engelmanshoven 1998 (Cherry, sour Kollaris)	480 SC	0.18	0.012	2	Fruit, whole	0 <sup>1</sup>	0.03	Schoening, R. 1999a RA-2070/98		
						0	0.33			
						7	0.10			
						14	<u>0.04</u>			
						21	< 0.02			
Germany Wachtberg – Niederbachem 1998 (Cherry, sour Schattenmorelle)	480 SC	0.18	0.012	2	Fruit, whole	0 <sup>1</sup>	< 0.02	Schoening, R. 1999a RA-2070/98		
						0	0.35			
						7	0.06			
						14	<u>0.02</u>			
						21	0.02			

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Toenisvorst- Tackheide 1998 (Cherry, sweet Castor)		480 SC	0.18	0.012	2	Fruit, whole	0 <sup>l</sup> 0 7 14	0.08 0.23 0.17 <u>0.15</u>	Schoening, R. 1999a RA-2070/98
France Jussy 1998 (Cherry, sweet Gemersdorf)		480 SC	0.15	0.012	2	Fruit, whole	0 <sup>l</sup> 0 7 14 21	0.02 0.22 0.13 <u>0.10</u> 0.05	Schoening, R. 1999a RA-2070/98
Germany Wachtberg – Niederbachem 1999 (Cherry, sour Schattenmorelle)		480 SC	0.12	0.012	2	Fruit, whole	0 14	0.24 < <u>0.02</u>	Sur, R. and Schoening, R. 2000 RA-2070/99
Germany Burscheid 1999 (Cherry, sour Schattenmorelle)		480 SC	0.12	0.012	2	Fruit, whole	0 14	0.47 <u>0.03</u>	Sur, R. and Schoening, R. 2000 RA-2070/99
Germany Muehlheim- Kehrllich 2002 (Cherry, sweet Regina)		480 SC	0.18	0.012	2	Fruit, whole	0 14	0.30 <u>0.11</u>	Schoening, R. and Billian, P. 2003 RA-2030/02
France Pouligny St. Pierre 2002 (Cherry, sweet Garnet)		480 SC	0.12	0.012	2	Fruit, whole	0 14	0.25 <u>0.06</u>	Schoening, R. and Billian, P. 2003 RA-2030/02
Italy Bisceglie 1998 (Cherry, sweet New Star)		480 SC	0.14	0.012	2	Fruit, whole	0 <sup>l</sup> 0 7 14 21	0.02 0.12 0.12 <u>0.06</u> 0.04	Schoening, R. 1999b RA-2071/98
Italy Bisceglie 1998 (Cherry, sweet Lapins)		480 SC	0.18	0.012	2	Fruit, whole	0 <sup>l</sup> 0 7 14 21	< 0.02 0.35 0.05 <u>0.02</u> < 0.02	Schoening, R. 1999b RA-2071/98
Italy Bisceglie 1999 (Cherry, sweet Lapins)		480 SC	0.15	0.012	2	Fruit, whole	0 14	0.17 <u>0.08</u>	Heinemann, O. and Schoening, R. 2000 RA-2071/99
Spain Begues 1999 (Cherry, sweet Starking)		480 SC	0.16	0.012	2	Fruit, whole	0 14	0.23 <u>0.07</u>	Heinemann, O. and Schoening, R. 2000 RA-2071/99
USA Porterville, California 2001 (Cherry, sweet Brooks)		480 SC	0.28	0.0083	2	Fruit, w/o stone	13 25	0.17, 0.18 (0.18) 0.13, 0.11 (0.12)	Dorschner, K. W. 2002 200540

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
USA Visalia, California 2001 (Cherry, sweet Brooks)		480 SC	0.28	0.044	2	Fruit, w/o stone	14  28	< 0.02, < 0.02 (< 0.02) < 0.02 < 0.02 (< 0.02)	Dorschner, K. W. 2002 200540	
USA Idaho 2001 (Cherry, sweet Brooks)		480 SC	0.28	0.012	2	Fruit, w/o stone	14  26	0.22, 0.25 (0.24) 0.15, 0.13 (0.14)	Dorschner, K. W. 2002 200540	
USA Michigan 2001 (Cherry, sweet Emperor Francis)		480 SC	0.29	0.0498	2	Fruit, w/o stone	14  28	0.22, 0.26 (0.24) 0.13, 0.11 (0.12)	Dorschner, K. W. 2002 200540	
USA Michigan 2001 (Cherry, sweet Cavalier)		480 SC	0.29	0.013	2	Fruit, w/o stone	13  27	0.12, 0.13 (0.13) 0.05, 0.05 (0.05)	Dorschner, K. W. 2002 200540	
USA Oregon 2001 (Cherry, sweet Bing)		480 SC	0.28	0.011	2	Fruit, w/o stone	14  26	0.18, 0.19 (0.19) 0.10, 0.09 (0.10)	Dorschner, K. W. 2002 200540	
USA Washington 2001 (Cherry, sweet Bing)		480 SC	0.295	0.047	2	Fruit, w/o stone	13  26	0.16, 0.17 (0.17) 0.05, 0.05 (0.05)	Dorschner, K. W. 2002 200540	
Japan, Alita  2003 (Satonishiki)		WG, 30	0.75	0.015	1	Thiacloprid: Whole fruit w/o stone    Thiacloprid-amide: Whole Fruit w/o stone	1  3  7  14  1  3  7  14	1.4, 1.4 ( <u>1.4</u> ) 0.8, 0.7 (0.8) 1.1, 1.0 (1.1) 0.6, 0.5 (0.6)  < 0.2, < 0.2 (< 0.2) < 0.2, < 0.2 (< 0.2) < 0.2, < 0.2 (< 0.2) < 0.2, < 0.2 (< 0.2)	Anon. 2003	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Fukushima 2003 (Satonishiki)		WG, 30	0.75	0.015	1	Thiacloprid: Whole fruit w/o stone	1	2.4, 2.3 ( <u>2.4</u> )	Anon. 2003
							3	2.3, 2.1 (2.2)	
							7	2.4, 2.3 (2.4)	
							14	1.7, 1.7 (1.7)	
						Thiacloprid-amide: Whole Fruit w/o stone	1	< 0.2, < 0.2 ( <u>&lt; 0.2</u> )	
							3	< 0.2, < 0.2 ( <u>&lt; 0.2</u> )	
							7	< 0.2, < 0.2 ( <u>&lt; 0.2</u> )	
							14	< 0.2, < 0.2 ( <u>&lt; 0.2</u> )	

1 sampling before last application

Table 33. Thiacloprid residues resulting from foliar application to plums.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
France Billy 2002 (Mirabelle de Nancy)		480 SC	0.1	0.0097	2	Fruit, whole	0 14	0.08 <u>0.02</u>	Schoening, R. and Billian, P. 2003a RA-2080/02
France Thillot 2003 (Mirabelle de Nancy)		480 SC	0.096	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 4 10 14 18	0.03. 0.07 0.03 0.02 <u>0.03</u> 0.03	Schoening, R. and Billian, P. 2003a RA-2080/02
Germany Freinsheim 2000 (Auerbacher)		480 SC	0.11	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 4 10 14 18	< 0.02 0.04 0.03 < 0.02 <u>&lt; 0.02</u> < 0.02	Schoening, R. 2001d RA-2126/00
France Saint Maurice 2000 (Dark Red Plum)		480 SC	0.16	0.015	2	Fruit, whole	0 <sup>1</sup> 0 4 10 13 17	0.02 0.08 0.03 0.02 <u>0.02</u> < 0.02	Schoening, R. 2001d RA-2126/00
Germany Freinsheim 2000 (Cydimer)		480 SC	0.11	0.0096	2	Fruit, whole	0 14	0.02 < <u>0.02</u>	Schoening, R. 2001d RA-2126/00
France Vieville 2000 (Dark Red Plum)		480 SC	0.14	0.014	2	Fruit, whole	0 13	0.11 <u>0.05</u>	Schoening, R. 2001d RA-2126/00
Germany Freinsheim 2001 (Cydimer)		480 SC	0.12	0.0096	2	Fruit, whole	0 14	0.03 < <u>0.02</u>	Schoening, R. 2002a RA-2120/01

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Germany Freinsheim 2001 (Auerbacher)		480 SC	0.12	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 4 10 14 18	< 0.02 0.05 0.04 0.02 <u>0.03</u> < 0.02	Schoening, R. 2002a RA-2120/01	
France Moissac 2001 (Prune d'Ente)		480 SC	0.14	0.0096	2	Fruit, whole	0 15	0.03 <u>0.02</u>	Schoening, R. 2002b RA-212101	
France Montauban 2001 (President)		480 SC	0.096	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 4 10 14 18	< 0.02 < 0.02 < 0.02 < 0.02 <u>&lt; 0.02</u> < 0.02	Schoening, R. 2002b RA-2121/01	
Spain St. Feliu de Llobregat 2000 (Black Goal)		480 SC	0.14	0.0096	2	Fruit, whole	0 4 11 14 19	0.06 0.04 0.03 <u>0.02</u> < 0.02	Schoening, R. 2002c RA-2127/00	
Spain St. Vincent dels Horts 2000 (Golden Japan)		480 SC	0.14	0.0096	2	Fruit, whole	0 14	0.04 <u>0.02</u>	Schoening, R. 2002c RA-2127/00	
France Montauban 2000 (President)		480 SC	0.096	0.0096	2	Fruit, whole	0 <sup>1</sup> 0 4 10 14 18	< 0.02 < 0.02 < 0.02 < 0.02 <u>&lt; 0.02</u> < 0.02	Schoening, R. 2002c RA-2127/00	
France Orgueil 2000 (President)		480 SC	0.096	0.0096	2	Fruit, whole	0 14	0.02 <u>&lt; 0.02</u>	Schoening, R. 2002c RA-2127/00	
USA California 2001 (Casselman)		480 SC	0.29	0.046	2	Fruit, w/o stone	15 29	0.03, < 0.02 (0.03) < 0.02, < 0.02 (< 0.02)	Dorschner, K. W. 2002a 200509	
						Fruit, dried w/o stone	15 29	0.05, 0.05 (0.05) 0.05, 0.08 (0.07)		
USA California 2001 (Black Beaut)		480 SC	0.29	0.012	2	Fruit, w/o stone	14 28	< 0.02, < 0.02 (< 0.02) < 0.02, < 0.02 (< 0.02)	Dorschner, K. W. 2002a 200509	
USA California 2001 (Angeleno)		480 SC	0.28	0.012	2	Fruit, w/o stone	14 28	< 0.02, < 0.02 (< 0.02) < 0.02, < 0.02 (< 0.02)	Dorschner, K. W. 2002a 200509	
USA California 2001 (French)		480 SC	0.28	0.014	2	Fruit, w/o stone	14 28	0.03, 0.03 (0.03) 0.03, 0.03 (0.03)	Dorschner, K. W. 2002a 200509	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
USA Michigan 2001 (Early Golden)		480 SC	0.28	0.060	2	Fruit, w/o stone	0	0.06, 0.04 (0.05)	Dorschner, K. W. 2002a 200509	
							7	0.08, 0.06 (0.07)		
							14	< 0.02, 0.03 (0.03)		
							28	0.03, 0.03 (0.03)		
							33	< 0.02, 0.02 (0.02)		
USA Oregon 2001 (Brooks)		480 SC	0.28	0.069	2	Fruit, w/o stone	15	< 0.02, < 0.02 (< 0.02)	Dorschner, K. W. 2002a 200509	
							26	< 0.02, < 0.02 (< 0.02)		
Japan, Nagano  2001 (Ohishiwase)		30 WG	0.6	0.015	3	Thiacloprid: Whole fruit w/o stone	0 <sup>1</sup>	< 0.01, < 0.01, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 1997ab, 1997ac, 1997ad, 1997ae	
							7	0.06, 0.05, 0.03 <sup>2</sup> , 0.03 <sup>2</sup> (0.04)		
							14	0.02, 0.02, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.02)		
							21	0.06, 0.06, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.04)		
							0 <sup>1</sup>	< 0.01, < 0.01 < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		
						Thiacloprid/amide: Whole Fruit w/o stone	7	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		
							14	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		
							21	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report	
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues			
Japan, Wakayama  2001 (Ohishiwase)		30 WG	0.6	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.01, < 0.01, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)	Anon. 1997ab, 1997ac, 1997ad, 1997ae		
								7		0.11, 0.10, 0.07 <sup>2</sup> , 0.06 <sup>2</sup> (0.09)	
								14		0.05, 0.05, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.04)	
								21		0.06, 0.06, 0.04 <sup>2</sup> , 0.04 <sup>2</sup> (0.05)	
								Thiacloprid/amide: Whole Fruit		0 <sup>1</sup>	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)
											7
						14	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)				
						21	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)				

1 sampling before last application

2 replicate analysis

*Berries and other small fruits*

Table 34. Thiacloprid residues resulting from foliar application to grapes (glasshouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Ishikawa  2002 (Delaware)		WG, 30	0.6	0.015	2	Thiacloprid: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> ( < 0.02)	Anon. 2002c, 2002d	
								21		0.96, 0.94, 0.64 <sup>2</sup> , 0.64 <sup>2</sup> (0.80)

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
						Thiacloprid-amide: Berries	28	0.67, 0.66, 0.53 <sup>2</sup> , 0.53 <sup>2</sup> (0.60)		
							42	0.90, 0.88, 0.56 <sup>2</sup> , 0.54 <sup>2</sup> (0.72)		
							0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							21	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							28	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							42	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
Japan, Osaka		WG, 30	0.6	0.015	2	Thiacloprid: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)	Anon. 2002c, 2002d	
2002 (Delaware)							21	1.9, 1.9, 1.4 <sup>2</sup> , 1.3 <sup>2</sup> (1.6)		
							28	1.8, 1.8, 1.5 <sup>2</sup> , 1.4 <sup>2</sup> (1.6)		
							49	1.3, 1.3, 0.85 <sup>2</sup> , 0.83 <sup>2</sup> (1.1)		
						Thiacloprid-amide: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							21	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							28	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		
							42	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Nagano  2002 (Kyoho)	WG, 30	0.6	0.015	2	Thiacloprid: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )	Anon. 2002a, 202b	
						21	0.46, 0.43, 0.27 <sup>2</sup> , 0.26 <sup>2</sup> (0.36)		
						28	0.45, 0.44, 0.45 <sup>2</sup> , 0.43 <sup>2</sup> ( <u>0.44</u> )		
						42	0.37, 0.37, 0.26 <sup>2</sup> , 0.26 <sup>2</sup> (0.32)		
					Thiacloprid-amide: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						21	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						28	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						42	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
Japan, Kyoto  2002 (Pione)	WG, 30	0.6	0.015	2	Thiacloprid: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )	Anon. 2002a, 202b	
						21	0.11, 0.11, 0.07 <sup>2</sup> , 0.07 <sup>2</sup> (0.09)		
						29	0.06, 0.06, 0.05 <sup>2</sup> , 0.05 <sup>2</sup> (0.06)		
						42	0.12, 0.12, 0.13 <sup>2</sup> , 0.12 <sup>2</sup> ( <u>0.12</u> )		
					Thiacloprid-amide: Berries	0 <sup>1</sup>	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						21	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						29	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		
						29	< 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> , ( <u>&lt; 0.02</u> )		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							42	< 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02) < 0.02, < 0.02, < 0.02 <sup>2</sup> , < 0.02 <sup>2</sup> (< 0.02)		

1 sampling before last application

2 replicate analysis

Table 35. Thiacloprid residues resulting from foliar application to strawberries (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Belgium Riemst 2000 (Elsanta)		480 SC	0.12	0.02	2	Fruit	0 3	0.1 <u>0.07</u>	Schoening, R. and Nuesslein, F. 2001 RA-2053/00	
France Ecquevilly 2000 (Majeral)		480 SC	0.12	0.02	2	Fruit	0 3	0.02 <u>0.02</u>	Schoening, R. and Nuesslein, F. 2001 RA-2053/00	
United Kingdom Thurston 2000 (Cambridge Favourite)		480 SC	0.12	0.02	2	Fruit	0 3	0.06 <u>0.09</u>	Schoening, R. and Nuesslein, F. 2001 RA-2053/00	
Germany Monheim 2000 (Elsanta)		480 SC	0.12	0.02	2	Fruit	0 3	0.07 <u>0.08</u>	Schoening, R. and Nuesslein, F. 2001 RA-2053/00	
Germany Leverkusen 1999 (Elsanta)		480 SC	0.12	0.02	2	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.03 0.13 0.09 <u>0.08</u> 0.05 0.03	Schoening, R. 2000a RA-2006/99	
Germany Monheim 1999 (Symphonie)		480 SC	0.12	0.02	2	Fruit	0 <sup>1</sup> 0 1 3 8 14	< 0.02 0.06 0.04 <u>0.03</u> 0.02 < 0.02	Schoening, R. 2000a RA-2006/99	
France Glisolles  1999 (Pandora)		480 SC	0.12	0.02	2	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.05 0.10 0.05 <u>0.04</u> 0.04 0.02	Schoening, R. 2000a RA-2006/99	
United Kingdom Thurston  1999 (Cambridge Favourite)		480 SC	0.12	0.02	2	Fruit	0 <sup>1</sup> 0 1 3 7 14	< 0.02 0.05 0.06 <u>0.07</u> 0.06 0.04	Schoening, R. 2000a RA-2006/99	

1 sampling before last application

Table 36. Thiacloprid residues resulting from foliar application to strawberries (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Telgte  2002 (Elsanta)		480 SC	0.12	0.012	2	Fruit	0 1 3	0.34 <u>0.31</u> 0.25	Schoening, R. and Billian, P. 2003b RA-2081/02
Germany Bocholt  2002 (Elsanta)		480 SC	0.12	0.012	2	Fruit	0 1 3	0.34 <u>0.33</u> 0.21	Schoening, R. and Billian, P. 2003b RA-2081/02
Netherlands Wognum  2002 (Elsanta)		480 SC	0.12	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.07 0.13 0.12 0.12 <u>0.13</u>	Schoening, R. and Billian, P. 2003b RA-2081/02
Netherlands Wognum  2002 (Polka)		480 SC	0.12	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.13 0.26 <u>0.31</u> 0.27 0.31	Schoening, R. and Billian, P. 2003b RA-2081/02
Italy Francolino  2002 (Marmolada)		480 SC	0.12	0.012	2	Fruit	0 1 3	0.05 < 0.02 <u>0.04</u>	Schoening, R. and Billian, P. 2003b RA-2081/02
Spain Sant Pol de Mar  2002 (Aromas)		480 SC	0.12	0.012	2	Fruit	0 1 3	0.20 0.19 <u>0.22</u>	Schoening, R. and Billian, P. 2003b RA-2081/02
Spain Calella  2002 (Diamante)		480 SC	0.12	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.12 0.39 <u>0.31</u> 0.23 0.25	Schoening, R. and Billian, P. 2003b RA-2081/02
France Reynies  2002 (Gariguette)		480 SC	0.12	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.04 0.06 <u>0.05</u> 0.05 0.04	Schoening, R. and Billian, P. 2003b RA-2081/02
Japan, Saitama  1997 (Nyohou)		30 WG	0.15	0.0075	2	Thiacloprid: Whole fruit           Thiacloprid/amide: Whole Fruit	0 <sup>1</sup>           0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) 0.41, 0.41, 0.34 <sup>2</sup> , 0.34 <sup>2</sup> (0.38) 0.38, 0.35, 0.31 <sup>2</sup> , 0.28 <sup>2</sup> (0.33) 0.24, 0.23, 0.19 <sup>2</sup> , 0.18 <sup>2</sup> (0.21) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 1996d, 1996e, 1996f, 1996g

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							1	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
							3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
Japan, Mie  1997 (Nyohou)		30 WG	0.15	0.0075	2	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)	Anon. 1996d, 1996e, 1996f, 1996g	
							1	0.81, 0.80, 0.69 <sup>2</sup> 0.68 <sup>2</sup> (0.75)		
							3	0.59, 0.52, 0.72 <sup>2</sup> , 0.69 <sup>2</sup> (0.63)		
							7	0.53, 0.50, 0.47 <sup>2</sup> , 0.47 <sup>2</sup> (0.49)		
						Thiacloprid/amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
							1	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
							3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( < 0.005)		

1 sampling before last application

2 replicate analysis

Table 37. Thiacloprid residues resulting from foliar application to currants.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Burscheid  2000 (Rofet)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.10 0.28 0.23 <u>0.21</u> 0.13 0.08	Schoening, R. and Nuesslein, F. 2001a RA-2054/00
Belgium Pringen  2000 (Tsema)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.21 0.38 0.39 <u>0.35</u> 0.32 0.32	Schoening, R. and Nuesslein, F. 2001a RA-2054/00
Germany Monheim  2000 (Red Lake)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 13	0.35 0.91 0.73 <u>0.59</u> 0.39 0.32	Schoening, R. and Nuesslein, F. 2001a RA-2054/00
United Kingdom Thurston  2000 (Ben Tirran)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.06 0.13 0.12 0.19 <u>0.28</u> 0.13	Schoening, R. and Nuesslein, F. 2001a RA-2054/00
Belgium Meeffe 2001 (Rovada)		480 SC	0.12	0.012	3	Fruit	0 3	0.19 <u>0.16</u>	Schoening, R. 2002d RA-2111/01
United Kingdom Thurston 2001 (Ben Tirran)		480 SC	0.12	0.012	3	Fruit	0 3	0.43 <u>0.37</u>	Schoening, R. 2002d RA-2111/01
Germany Burscheid 2001 (Rovada)		480 SC	0.12	0.012	3	Fruit	0 3	0.24 <u>0.21</u>	Schoening, R. 2002d RA-2111/01
Germany Burscheid 2001 (Titania)		480 SC	0.12	0.012	3	Fruit	0 3	0.19 <u>0.08</u>	Schoening, R. 2002d RA-2111/01

1 sampling before last application

Table 38. Thiacloprid residues resulting from foliar application to raspberries.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Wachtberg- Niederbachem  2001 (Resa)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	< 0.02 0.34 0.37 <u>0.15</u> 0.09 0.05	Heinemann, O. and Schoening, R. 2002 RA-2133/01
Germany Monheim  2001 (Schoenemann)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.12 0.81 0.88 <u>0.10</u> 0.08 0.06	Heinemann, O. and Schoening, R. 2002 RA-2133/01

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
United Kingdom Thurston  2001 (Malling Jewel)		480 SC	0.12 0.12 0.16	0.012 0.012 0.016	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.10 0.55 0.50 <u>0.31</u> 0.17 0.08	Heinemann, O. and Schoening, R. 2002 RA-2133/01	
United Kingdom East Malling  2001 (Ample)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7 14	0.04 0.29 0.31 <u>0.27</u> 0.19 0.09	Heinemann, O. and Schoening, R. 2002 RA-2133/01	
Germany Burscheid  2002 (Winklers Sämling)		480 SC	0.12	0.012	3	Fruit	0 3	0.76 <u>0.62</u>	Schoening, R. and Billian, P. 2003c RA-2082/02	
Germany Monheim  2002 (Schoenemann)		480 SC	0.12	0.012	3	Fruit	0 3	0.36 <u>0.34</u>	Schoening, R. and Billian, P. 2003c RA-2082/02	
United Kingdom Thurston  2002 (Malling Jewel)		480 SC	0.12	0.012	3	Fruit	0 3	0.49 <u>0.34</u>	Schoening, R. and Billian, P. 2003c RA-2082/02	
United Kingdom East Malling  2002 (Ample)		480 SC	0.12	0.012	3	Fruit	0 3	0.27 <u>0.15</u>	Schoening, R. and Billian, P. 2003c RA-2082/02	

1 sampling before last application

*Tropical fruits – inedible peel*

Table 39. Thiacloprid residues resulting from foliar application to kiwi fruits.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
New Zealand Ramarama  2002 (Hayward)		480 SC	0.096	0.0048	1	Fruit	56 84 112 140 184	< 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Clay, S. 2003a LabGLP75	
New Zealand Ramarama  2002 (Hayward)		480 SC	0.096	0.0048	2	Fruit	56 84 112 140 184	< 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Clay, S. 2003a LabGLP75	
New Zealand Ramarama  2002 (Hayward)		480 SC	0.14	0.0072	1	Fruit	56 84 112 140 184	< <u>0.02</u> < 0.02 < 0.02 < 0.02 < 0.02	Clay, S. 2003a LabGLP75	



Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
New Zealand Appleby  2003 (Hayward)		480 SC	0.19	0.0096	2	Fruit	70	< 0.02	Clay, S. 2004 LabGLP104
							77	< 0.02	
							84	< 0.02	
							91	< 0.02	
							98	< 0.02	
105	< 0.02								
New Zealand Appleby  2003 (Hayward)		480 SC	0.19	0.0096	2	Fruit	49	< 0.02	Clay, S. 2004 LabGLP104
							56	< 0.02	
							63	< 0.02	
							70	< 0.02	
							77	< 0.02	
84	< 0.02								

### Bulb vegetables

Table 40. Thiacloprid residues resulting from foliar application to onions.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Brazil Sta. Inacia 1998 (Taqui / Superex)		480 SC	0.096	0.024	4	Bulb	21	< 0.02	Lancas, F. M. 1998b M-005335-01-2
Brazil Sta. Inacia 1998 (Taqui / Superex)		480 SC	0.19	0.048	4	Bulb	21	0.04	Lancas, F. M. 1998b M-005335-01-2
Germany Schifferstadt 2004 (Elody)		480 SC	0.11	0.24	3	bulb	21 28	< 0.01 < 0.01	Schoening, R. 2005 MR-068/05
Germany Schifferstadt 2004 (Elody)		480 SC	0.1 0.096 0.096	0.016	3	Bulb	0 7 10 14	0.55 0.06 0.03 0.02	Schoening, R. 2005 MR-068/05
Germany Schifferstadt 2004 (Elody)		480 SC	0.096	0.016	3	Bulb	0 7 10 14	0.69 0.05 0.03 0.03	Schoening, R. 2005 MR-068/05
Germany Aholming 2004 (BGS 194)		480 SC	0.096	0.024	3	bulb	21 28	< 0.01 < 0.01	Schoening, R. 2005 MR-068/05

Table 41. Thiacloprid residues resulting from foliar application to garlic.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Brazil Fazenda Riberao 1998 (Lavinia)		480 SC	0.14	0.036	3	Bulb	21	0.12	Lancas, F. M. 1998c M-005328-01-2
Brazil Fazenda Riberao 1998 (Lavinia)		480 SC	0.29	0.072	3	Bulb	21	0.2	Lancas, F. M. 1998c M-005328-01-2

## Fruiting vegetables

Table 42. Thiacloprid residues resulting from foliar application to eggplants (glasshouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Kochi  2001 (Ryuma)		WG, 30	0.3	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 2001, 2001a	
							1	0.44, 0.42, 0.34 <sup>2</sup> , 0.33 <sup>2</sup> ( <u>0.38</u> )		
							3	0.24, 0.22, 0.30 <sup>2</sup> , 0.30 <sup>2</sup> (0.27)		
							7	0.1, 0.06, 0.1 <sup>2</sup> , 0.1 <sup>2</sup> (0.09)		
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							1	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
Japan, Miyazaki  2001 (Kokuyou)		WG, 30	0.3	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 2001, 2001a	
							1	0.27, 0.26, 0.29 <sup>2</sup> , 0.28 <sup>2</sup> ( <u>0.28</u> )		
							3	0.24, 0.23, 0.22 <sup>2</sup> , 0.21 <sup>2</sup> (0.23)		
							7	0.15, 0.14, 0.16 <sup>2</sup> , 0.16 <sup>2</sup> (0.15)		
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							1	(< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup>		
							3	(< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup>		
							7	(< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup>		

1 sampling before last application

2 replicate analysis

Table 43. Thiacloprid residues resulting from foliar application to cucumbers (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Germany Vetschau 2004 (Dolomit)		480 SC	0.10 0.098	0.033	2	Fruit	3	0.03	Schoening, R. 2005a MR-067/05	
Germany Vetschau 2004 (Dolomit)		480 SC	0.10 0.11	0.035	2	Fruit	3	0.02	Schoening, R. 2005a MR-067/05	
Germany Aholming 2004 (Melody)		480 SC	0.096	0.024	2	Fruit	0 3 5	0.03 0.02 0.02	Schoening, R. 2005a MR-067/05	
Germany Niederhausen 2004 (Dirigent)		480 SC	0.096	0.024	2	Fruit	0 3 5	0.02 0.02 0.01	Schoening, R. 2005a MR-067/05	
Spain Cabrera de Mar 1995 (Dasher II)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 3 7 9	0.02 0.12 <u>0.03</u> 0.02 < 0.02	Placke, F. J. 1997g RA-2066/95	
Italy Borgo Piave  1995 (Hyeld)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 3 7 10	< 0.02 0.05 <u>0.03</u> < 0.02 < 0.02	Placke, F. J. 1997g RA-2066/95	
Italy Comiso  1995 (Galo F1)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 3 7 10	0.02 0.16 <u>0.10</u> 0.03 < 0.02	Placke, F. J. 1997g RA-2066/95	
Spain Viladecans  1995 (Dasher II)		480 SC	0.12	0.012	3	Fruit	0 <sup>1</sup> 0 3 7 9	0.02 0.05 <u>0.02</u> 0.02 < 0.02	Placke, F. J. 1997g RA-2066/95	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Cabrera de Mar	1996 (Dasher)	480 SC	0.14	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.02 0.08 <u>0.11</u> 0.08 < 0.02	Placke, F. J. 1997h RA-2116/96	
Italy Fondi	1996 (Hyeld)	480 SC	0.14	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	< 0.02 0.04 <u>0.04</u> 0.02 < 0.02	Placke, F. J. 1997h RA-2116/96	
Italy Borgo Piave	1996 (Hyeld)	480 SC	0.14	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	< 0.02 0.03 <u>0.03</u> 0.02 < 0.02	Placke, F. J. 1997h RA-2116/96	
Spain Gava	1996 (Dasher)	480 SC	0.14	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.04 0.12 <u>0.14</u> 0.08 0.03	Placke, F. J. 1997h RA-2116/96	

1 sampling before last application

Table 44. Thiacloprid residues resulting from foliar application to cucumbers (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Germany Leichlingen	1999 (Indira)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.04 0.13 0.12 <u>0.08</u> 0.04	Schoening, R. 2000a RA-2134/99	
Germany Leichlingen	1999 (Indira)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.03 0.08 0.10 <u>0.07</u> 0.04	Schoening, R. 2000a RA-2134/99	
Belgium Brecht	1999 (Korinda)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.02 0.14 0.12 <u>0.08</u> 0.03	Schoening, R. 2000a RA-2134/99	
Netherlands HS Tholen	1999 (Flamingo)	480 SC	0.22 0.20 0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.02 0.05 0.07 <u>0.04</u> 0.02	Schoening, R. 2000a RA-2134/99	
Greece Vasilika	1996 (Venus)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.06 0.18 0.17 <u>0.12</u> 0.05	Placke, F. J. 1997i RA-2117/96	
Italy Pozzo Ribauda	1996 (Sprint)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.04 0.13 0.11 <u>0.08</u> 0.04	Placke, F. J. 1997i RA-2117/96	
Italy Fondi	1996 (Hyeld)	480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.03 0.12 0.10 <u>0.07</u> 0.03	Placke, F. J. 1997i RA-2117/96	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Spain Ruescas  1996 (Alaska)		480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup>	0.07	Placke, F. J. 1997i RA-2117/96
							0	0.25	
							1	0.18	
							3	<u>0.15</u>	
							7	0.09	
France Avignon  1996 (Aramon)		480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup>	0.02	Placke, F. J. 1997i RA-2117/96
							0	0.08	
							1	0.08	
							3	<u>0.04</u>	
							7	0.05	
Italy Bosco Braccetto  1996 (Sprint)		480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup>	0.05	Placke, F. J. 1997i RA-2117/96
							0	0.08	
							1	0.09	
							3	<u>0.08</u>	
							7	0.05	
Spain Ruescas  1996 (Alaska)		480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup>	0.09	Placke, F. J. 1997i RA-2117/96
							0	0.23	
							1	0.20	
							3	<u>0.15</u>	
							7	0.07	
Spain Ruescas  1996 (Virginia)		480 SC	0.22	0.014	3	Fruit	0 <sup>1</sup>	0.08	Placke, F. J. 1997i RA-2117/96
							0	0.26	
							1	0.26	
							3	<u>0.18</u>	
							7	0.07	

1 sampling before last application

Table 45. Thiacloprid residues resulting from foliar application to melons (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Greece Larisa  1995 (Midi Star)		480 SC	0.12	0.012	3	Peel	0 <sup>1</sup>	0.03	Placke, F. J. 1997j RA-2061/95
							0	0.08	
							3	0.02	
							7	0.02	
							10	< 0.02	
						Pulp	0 <sup>1</sup>	< 0.02	
							0	< 0.02	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
						Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02	
							0	0.04	
							3	< <u>0.02</u>	
							7	< 0.02	
							10	< 0.02	
Italy Trinitapoli  1995 (Leglend)		480 SC	0.12	0.012	3	Peel	0 <sup>1</sup>	0.02	Placke, F. J. 1997j RA-2061/95
							0	0.23	
							3	0.08	
							7	0.05	
							10	< 0.02	
						Pulp	0 <sup>1</sup>	< 0.02	
							0	< 0.02	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
						Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
							0 3 7 10	0.09 <u>0.03</u> 0.02 < 0.02	
Greece Larisa  1996 (Gold Star F1)		480 SC	0.14	0.014	3	Whole fruit  Peel  Pulp  Whole fruit <sup>2</sup>	0 <sup>1</sup> 0 1  3 7  3 7  3 7	0.04 0.05 0.06  0.36 0.28  < 0.02 < 0.02  <u>0.06</u> 0.04	Placke, F. J. 1997k RA-2118/96
Italy Lequile  1996 (Galia)		480 SC	0.14	0.014	3	Whole fruit  Peel  Pulp  Whole fruit <sup>2</sup>	0 <sup>1</sup> 0 1  3 7  3 7  3 7	0.03 0.06 0.06  0.23 0.23  < 0.02 < 0.02  <u>0.06</u> 0.06	Placke, F. J. 1997k RA-2118/96
France Verlhac7Tescou  2000 (Figaro)		480 SC	0.14	0.014	3	Whole fruit  Peel  Pulp	0 3  3  3	0.07 <u>0.05</u>  0.13  < 0.02	Schoening, R. and Nuesslein, F. 2001b RA-2115/00
France Sarrians  2000 (Sirio)		480 SC	0.14	0.014	3	Whole fruit  Peel Pulp	0 3  3 3	0.05 <u>0.02</u>  0.05 < 0.02	Schoening, R. and Nuesslein, F. 2001b RA-2115/00

1 sampling before last application

2 calculated

Table 46. Thiacloprid residues resulting from foliar application to melons (glasshouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Ishikawa 1997 (Arlseseinunatu II)		WG, 30	0.38	0.015	3	Thiacloprid: Pulp	0 <sup>1</sup>          1          3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 1997d, 1997e, 1997f, 1997g

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
							6	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
						Thiacloprid-amide: Pulp	0 <sup>1</sup>  1  3  6	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
Japan, Aichi  1997 (Natsukei No. 15)		WG, 30	0.38	0.015	3	Thiacloprid: Pulp	0 <sup>1</sup>  1  3  7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 1997d, 1997e, 1997f, 1997g	
						Thiacloprid-amide: Pulp	0 <sup>1</sup>  1  3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	

1 sampling before last application

2 replicate analysis

Table 47. Thiacloprid residues resulting from foliar application to watermelons (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Greece Larisa  1995 (Crimson Sweet)		480 SC	0.12	0.012	3	Peel	0 <sup>1</sup>	< 0.02	Placke, F. J. 1997j RA-2061/95
							0	0.03	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
						Pulp	0 <sup>1</sup>	< 0.02	
							0	< 0.02	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
						Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02	
							0	< 0.02	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
Spain Gavá  1995 (Super Sugarbaby)		480 SC	0.12	0.012	3	Peel	0 <sup>1</sup>	0.04	Placke, F. J. 1997j RA-2061/95
							0	0.07	
							3	0.03	
							7	< 0.02	
							10	< 0.02	
						Pulp	0 <sup>1</sup>	< 0.02	
							0	< 0.02	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
						Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02	
							0	0.03	
							3	< 0.02	
							7	< 0.02	
							10	< 0.02	
Spain Gavá  1996 (Patanegra)		480 SC	0.14	0.014	3	Whole fruit	0 <sup>1</sup>	< 0.02	Placke, F. J. 1997k RA-2118/96
							0	< 0.02	
							1	< 0.02	
							3	< 0.02	
							7	< 0.02	
						Peel	3	< 0.02	
							7	< 0.02	
						Pulp	3	< 0.02	
							7	< 0.02	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Spain La Almunia  1996 (Meridiam)		480 SC	0.14	0.014	3	Whole fruit	0 <sup>1</sup>	0.03	Placke, F. J. 1997k RA-2118/96
							0	0.08	
							1	0.07	
						Peel	3	<u>0.06</u>	
							7	0.06	
							3	0.10	
						Pulp	7	< 0.02	
							3	< 0.02	
							7	< 0.02	

1 sampling before last application

2 calculated

Table 48. Thiacloprid residues resulting from foliar application to watermelons (glasshouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.	
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Ishikawa  2002 (Ajihimitsu)		30 WG	0.3	0.015	3	Thiacloprid: Pulp	0 <sup>1</sup>	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)	Anon. 2002f, 2002g	
							1	0.05, 0.04, 0.04 <sup>2</sup> , 0.04 <sup>2</sup> (0.04)		
							3	0.1, 0.1, 0.09 <sup>2</sup> , 0.09 <sup>2</sup> (0.1)		
							7	0.08, 0.07, 0.07 <sup>2</sup> , 0.07 <sup>2</sup> (0.07)		
							Thiacloprid-amide: Pulp	0 <sup>1</sup>		< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)
								1		< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)
						3		< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		
						7		< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> (< 0.01)		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Miyazaki  2002 (Madarball No. 2)		30 WG	0.36	0.015	3	Thiacloprid: Pulp	0 <sup>1</sup>	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)	Anon. 2002f, 2002g	
							1	0.08, 0.07, 0.07 <sup>2</sup> , 0.07 <sup>2</sup> (0.07)		
							3	0.02, 0.02, 0.02 <sup>2</sup> , 0.02 <sup>2</sup> (0.02)		
							7	0.06, 0.06, 0.05 <sup>2</sup> , 0.05 <sup>2</sup> (0.06)		
						Thiacloprid-amide: Pulp	0 <sup>1</sup>	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)		
							1	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)		
							3	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)		
							7	< 0.01, < 0.01, < 0.01 <sup>2</sup> , < 0.01 <sup>2</sup> ( < 0.01)		

1 sampling before last application

2 replicate analysis

Table 49. Thiacloprid residues resulting from foliar application to tomatoes (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Italy Andria  1995 (EXH 98063)		480 SC	0.18	0.018	2	Fruit	0 <sup>1</sup>	0.02	Placke, F. J. 19971 RA-2068/95	
							0	0.17		
							1	0.09		
							3	<u>0.03</u>		
							7	0.02		
France Pernes les Fontaines 1995 (Levica)		480 SC	0.18	0.064	2	Fruit	0 <sup>1</sup>	0.02	Placke, F. J. 19971 RA-2068/95	
							0	0.07		
							1	0.07		
							3	<u>0.02</u>		
							7	< 0.02		
France Tarascon  1995 (Cannegrow)		480 SC	0.18	0.064	2	Fruit	0 <sup>1</sup>	0.04	Placke, F. J. 19971 RA-2068/95	
							0	0.14		
							1	0.12		
							3	<u>0.03</u>		
							8	0.03		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Italy Borgo Piave  1995 (Sunseed 6078)		480 SC	0.18	0.018	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.03 0.08 0.06 <u>0.05</u> 0.05	Placke, F. J. 1997l RA-2068/95	
Italy Giorio 1996 (Marmende)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.14 0.12 <u>0.16</u>	Placke, F. J. 1997n RA-2122/96	
France Les Valayans 1996 (Lerika)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.06 <u>0.04</u> 0.02	Placke, F. J. 1997n RA-2122/96	
France Tarascon 1996 (Cannegrow)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.18 <u>0.09</u> 0.03	Placke, F. J. 1997n RA-2122/96	
Italy Andria 1996 (Red Setter)		480 SC	0.14	0.014	2	Fruit	0 3 7	0.16 0.10 0.03	Placke, F. J. 1997n RA-2122/96	

1 sampling before last application

Table 50. Thiacloprid residues resulting from foliar application to tomatoes (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Germany Langenfeld- Reusrath 1995 (Hildares)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.11 0.26 0.19 <u>0.15</u> 0.14	Placke, F. J. 1997m RA-2067/95	
Germany Langenfeld- Reusrath 1995 (Piranto)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.02 0.22 0.20 <u>0.25</u> 0.03	Placke, F. J. 1997m RA-2067/95	
Spain La Redonda 1995 (Daniela)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.16 0.15 0.25 <u>0.18</u> 0.12	Placke, F. J. 1997m RA-2067/95	
Spain Ruescas  1995 (Billante)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.08 0.28 0.20 0.14 <u>0.19</u>	Placke, F. J. 1997m RA-2067/95	
Germany Langenfeld 1996 (Ferrari)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.23 <u>0.12</u> 0.08	Placke, F. J. 1997o RA-2123/96	
Germany Leichlingen 1996 (Panovy)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.10 <u>0.07</u> 0.06	Placke, F. J. 1997o RA-2123/96	
Spain Ruescas  1996 (Brillante)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.22 0.24 <u>0.29</u>	Placke, F. J. 1997o RA-2123/96	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
France Noves 1996 (Cecilia)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.18 <u>0.12</u> 0.09	Placke, F. J. 1997o RA-2123/96	
Japan, Nagano  1997 (Momotaro)		30 WG	0.38	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>  1 3 7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) 0.17, 0.16, 0.12 <sup>2</sup> , 0.11 <sup>2</sup> (0.14) 0.15, 0.15, 0.11 <sup>2</sup> , 0.10 <sup>2</sup> (0.13) 0.21, 0.21, 0.13 <sup>2</sup> , 0.12 <sup>2</sup> (0.17)	Anon. 1997x, 1997y, 1997z, 1997aa	
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>  1 3 7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Wakayama  1997 (Ohgatafukuju)		30 WG	0.38	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)	Anon. 1997x, 1997y, 1997z, 1997aa	
							1	0.09, 0.08, 0.06 <sup>2</sup> , 0.06 <sup>2</sup> (0.07)		
							3	0.05, 0.05, 0.06 <sup>2</sup> , 0.05 <sup>2</sup> (0.05)		
							7	0.08, 0.08, 0.04 <sup>2</sup> , 0.04 <sup>2</sup> (0.06)		
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							1	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( < 0.005)		

1 sampling before last application

2 replicate analysis

Table 51. Thiacloprid residues resulting from drip application to tomatoes (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Belgium Putte  1998 (Tradino)		480 SC	0.25 <sup>1</sup>	0.0096	1	Fruit	1	< 0.02	Schoening, R. 1999c RA-2072/98	
							3	< 0.02		
							7	< 0.02		
							14	<u>0.02</u>		
							21	0.02		
							28	< 0.02		
							35	< 0.02		
							49	< 0.02		
Belgium Katelinje-Waver  1998 (Fausto)		480 SC	0.24 <sup>1</sup>	0.0096	1	Fruit	1	< 0.02	Schoening, R. 1999c RA-2072/98	
							3	< 0.02		
							7	< 0.02		
							14	<u>0.02</u>		
							21	0.02		
							28	< 0.02		
							35	< 0.02		
							49	< 0.02		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Belgium Putte  1998 (Tradino)		480 SC	0.24 <sup>1</sup>	0.0096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < <u>0.02</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 1999c RA-2072/98
Belgium O-L-V Waver  1998 (Blitz)		480 SC	0.23 <sup>1</sup>	0.0096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 <u>0.03</u> 0.03 < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 1999c RA-2072/98
Belgium O-L-V Waver  1999 (Style)		480 SC	0.24 <sup>1</sup>	0.096	1	Fruit	1 3  7 15 21 28 35 49	< 0.02 < 0.02, < 0.02 (< 0.02) 0.02 <u>0.03</u> 0.03 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99
Netherlands Steenbergen  1999 (Jamaica)		480 SC	0.24 <sup>1</sup>	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < <u>0.02</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99
Belgium Katelinje-Waver  1999 (Tradiro)		480 SC	0.22 <sup>1</sup>	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 <u>0.02</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99
Netherlands Wouwse Plantage  1999 (Ambiance)		480 SC	0.25	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < <u>0.02</u> < 0.02 < 0.02 < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99

1 corresponding to 0.0096 kg ai per 1000 plants

Table 52. Thiacloprid residues resulting from foliar application to sweet peppers (field use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Viladecans  1995 (Lipari)		480 SC	0.18	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	< 0.02 0.19 0.24 <u>0.06</u> 0.04	Placke, F. J. 1997p RA-2070/95	
Italy Trinitapoli  1995 (Antares)		480 SC	0.18	0.018	2	Fruit	0 <sup>1</sup> 0 1 3 7	< 0.02 0.05 0.05 <u>0.05</u> < 0.02	Placke, F. J. 1997p RA-2070/95	
Italy C. da S. Giorgio  1995 (Pacific)		480 SC	0.18	0.018	2	Fruit	0 <sup>1</sup> 0 1 3 7	0.05 0.15 0.16 <u>0.10</u> 0.07	Placke, F. J. 1997p RA-2070/95	
Spain Malgrat de Mar  1995 (Italiano)		480 SC	0.18	0.012	2	Fruit	0 <sup>1</sup> 0 1 3 7	< 0.02 0.41 0.24 <u>0.11</u> 0.10	Placke, F. J. 1997p RA-2070/95	
Spain Vilanovadel Valles 1996 (Largo italiano)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.49 <u>0.45</u> 0.21	Placke, F. J. 1997r RA-2119/96	
Italy Pigno  1996 (Rino)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.19, 0.18 (0.19) 0.17, 0.15 (0.16) 0.21, 0.20 (0.21)	Placke, F. J. 1997r RA-2119/96	
Italy Andria  1996 (Antares)		480 SC	0.14	0.014	2	Fruit	0 3 7	0.07, 0.07 (0.07) 0.07, 0.07 (0.07) 0.04, 0.04 (0.04)	Placke, F. J. 1997r RA-2119/96	
France Pernes les Fontaines  1996 (Lipari)		480 SC	0.22	0.014	2	Fruit	0 3 7	0.15, 0.14 (0.15) 0.07, 0.07 (0.07) 0.09, 0.06 (0.08)	Placke, F. J. 1997r RA-2119/96	

1 sampling before last application

Table 53. Thiacloprid residues resulting from foliar application to sweet peppers (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Netherlands GS Breda  1995 (Cuby)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.07 0.09 0.09 <u>0.07</u> 0.05	Placke, F. J. 1997q RA-2069/95	
Netherlands SW Heerle  1995 (Spirit)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.07 0.13 0.14 0.08 <u>0.10</u>	Placke, F. J. 1997q RA-2069/95	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Ruescas		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.27 0.54 0.47 <u>0.37</u> 0.34	Placke, F. J. 1997q RA-2069/95	
1995 (Atol)		480 SC	0.18	0.012	3	Fruit	0 <sup>1</sup> 0 1 3 7	0.49 0.72 0.65 0.36 <u>0.38</u>	Placke, F. J. 1997q RA-2069/95	
Spain Ruescas		480 SC	0.22	0.014	3	Fruit	0 3 7	0.48 <u>0.37</u> 0.32	Placke, F. J. 1997s RA-2120/96	
1996 (Dallas)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.13 <u>0.11</u> 0.09	Placke, F. J. 1997s RA-2120/96	
France St. Remy de Provence		480 SC	0.22	0.014	3	Fruit	0 3 7	0.13 <u>0.11</u> 0.09	Placke, F. J. 1997s RA-2120/96	
1996 (Cyrano)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.36 <u>0.33</u> 0.21	Placke, F. J. 1997s RA-2120/96	
Spain El Ejido		480 SC	0.22	0.014	3	Fruit	0 3 7	0.36 <u>0.33</u> 0.21	Placke, F. J. 1997s RA-2120/96	
1996 (Mazurka)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.13 <u>0.08</u> 0.04	Placke, F. J. 1997s RA-2120/96	
France Les Sablons		480 SC	0.22	0.014	3	Fruit	0 3 7	0.13 <u>0.08</u> 0.04	Placke, F. J. 1997s RA-2120/96	
1996 (Laser)		480 SC	0.22	0.014	3	Fruit	0 3 7	0.13 <u>0.08</u> 0.04	Placke, F. J. 1997s RA-2120/96	
Japan, Kochi		30 WG	0.3	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>  1 3 7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) 1.3, 1.2, 0.97 <sup>2</sup> , 0.95 <sup>2</sup> ( <u>1.1</u> )	Anon. 1996, 1996a, 1996b, 1996c	
1997 (Tosahime)		30 WG	0.3	0.015	3	Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>  1 3 7	0.81, 0.80, 0.89 <sup>2</sup> , 0.83 <sup>2</sup> (0.83) 0.64, 0.58, 0.58 <sup>2</sup> , 0.56 <sup>2</sup> (0.59) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)	Anon. 1996, 1996a, 1996b, 1996c	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan, Miyazaki  1997 (TosahikariD)		30 WG	0.38	0.015	3	Thiacloprid: Whole fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( <u>&lt; 0.005</u> )	Anon. 1996, 1996a, 1996b, 1996c	
							1	2.2, 2.0, 1.9 <sup>2</sup> , 1.8 <sup>2</sup> ( <u>2.0</u> )		
							3	1.7, 1.6, 1.5 <sup>2</sup> , 1.5 <sup>2</sup> (1.6)		
							7	1.5, 1.4, 1.3 <sup>2</sup> , 1.3 <sup>2</sup> (1.4)		
						Thiacloprid-amide: Whole Fruit	0 <sup>1</sup>	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( <u>&lt; 0.005</u> )		
							1	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( <u>&lt; 0.005</u> )		
							3	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( <u>&lt; 0.005</u> )		
							7	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> , ( <u>&lt; 0.005</u> )		

1 sampling before last application

2 replicate analysis

Table 54. Thiacloprid residues resulting from drip application to peppers (greenhouse use).

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Belgium Katelinje-Waver  1998 (Mazurka)		480 SC	0.30 <sup>1</sup>	0.0096	1	Fruit	1	< 0.02	Schoening, R. 1999c RA-2072/98	
							3	< 0.02		
							7	0.03		
							14	<u>0.05</u>		
							21	0.05		
							28	0.04		
							35	< 0.02		
							49	< 0.02		
Belgium Katelinje-Waver  1998 (Meteor)		480 SC	0.41 <sup>1</sup>	0.0096	1	Fruit	1	< 0.02	Schoening, R. 1999c RA-2072/98	
							3	< 0.02		
							7	0.03		
							14	<u>0.05</u>		
							21	0.04		
							28	0.02		
							35	< 0.02		
							49	< 0.02		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Belgium Katelinje-Waver  1998 (Meteor)		480 SC	0.36 <sup>1</sup>	0.0096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 0.04 <u>0.05</u> 0.04 0.02 < 0.02 < 0.02	Schoening, R. 1999c RA-2072/98	
Belgium Katelinje-Waver  1998 (Mazurka)		480 SC	0.28 <sup>1</sup>	0.0096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 <u>0.05</u> 0.04 0.05 0.04 < 0.02 < 0.02	Schoening, R. 1999c RA-2072/98	
Netherlands Steenbergen  1999 (Fiesta)		480 SC	0.29 <sup>1</sup>	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 0.02 <u>0.07</u> <u>0.07</u> 0.06 0.05 < 0.02	Schoening, R. 2000b RA-2072/99	
Belgium Rumst  1999 (Meteor)		480 SC	0.22 <sup>1</sup>	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 0.03 <u>0.04</u> < 0.02 < 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99	
Belgium Katalijne-Waver  1999 (Mandy)		480 SC	0.32 <sup>1</sup>	0.096	1	Fruit	1 3 8 14 21 28 35 49	< 0.02 0.02 <u>0.06</u> 0.05 0.05 0.02 < 0.02 < 0.02	Schoening, R. 2000b RA-2072/99	
Netherlands Steenbergen  1999 (Spirit)		480 SC	0.32 <sup>1</sup>	0.096	1	Fruit	1 3 7 14 21 28 35 49	< 0.02 < 0.02 < 0.02 0.02 <u>0.04</u> 0.03 0.03 < 0.02	Schoening, R. 2000b RA-2072/99	

1 corresponding to 0.0096 kg ai per 1000 plant

*Root and tuber vegetables*

Table 55. Thiacloprid residues resulting from foliar application to potatoes.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Burscheid  1997 (Hansa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000c RA-2150/97
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
France Quatremare  1997 (Lisa)		480 SC	0.096	0.034	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000c RA-2150/97
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
Germany Burscheid  1998 (Hansa)		480 SC	0.096	0.024	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
United Kingdom Thurston  1998 (Desiree)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
Germany Monheim  1998 (Hansa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
			0.096 0.096			0.024 0.024	Total residue <sup>1</sup> Tuber	0 21	
United Kingdom Inham Hall  1998 (Fianna)		480 SC	0.096	0.032	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
France Quatremare  1998 (Mona Lisa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
Belgium Soreé  1998 (Bintje)		480 SC	0.096		3	Thiacloprid only: Tuber	0 21	< 0.02 < <u>0.02</u>	Schoening, R. 2000d RA-2068/98
						Total residue <sup>1</sup> Tuber	0 21	< 0.05 < 0.05	
Spain La Garriga  1997 (Red Pontiac)		480 SC	0.09	0.012	3	Thiacloprid only: Tuber	0 22	< 0.02 < <u>0.02</u>	Schoening, R. 2000e RA-2151/97
			0.096 0.096			0.012 0.012	Total residue <sup>1</sup> Tuber	0 22	

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Italy Molino dei Torti  1997 (Mona Lisa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup> Tuber	0 21  0 21	< 0.02 < <u>0.02</u>  < 0.05 < 0.05	Schoening, R. 2000e RA-2151/97
Spain Cabrera de Mar  1998 (Jerla)		480 SC	0.096 0.09 0.096	0.012 0.012 0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup>	0 21  0 21	< 0.02 < <u>0.02</u>  < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
Italy Borgo Piave  1998 (Symfonia)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup> Tuber	0 7 14 21  0 7 14 21	< 0.02 < 0.02 < 0.02 < <u>0.02</u>  < 0.05 < 0.05 < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
Italy Cervesina  1998 (Mona Lisa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup>	0 7 14 21  0 7 14 21	< 0.02 < 0.02 < 0.02 < <u>0.02</u>  < 0.05 < 0.05 < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
France Les Valayans  1998 (Mona Lisa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup> Tuber	0 21  0 21	< 0.02 < <u>0.02</u>  < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
France Noves  1998 (Mona Lisa)		480 SC	0.096	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup> Tuber	0 21  0 21	< 0.02 < <u>0.02</u>  < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
Spain Vilanova del Valles  1998 (Ped Pontiac)		480 SC	0.096 0.096 0.085	0.012	3	Thiacloprid only: Tuber  Total residue <sup>1</sup> Tuber	0 21  0 21	< 0.02 < <u>0.02</u>  < 0.05 < 0.05	Schoening, R. 2000f RA-2069/98
Brazil Facenda Rodeio 1998 (Jaete Bintje)		480 SC	0.14	0.024	4	Thiacloprid only: Tuber	21	< <u>0.02</u>	Lancas, F. M. 1998d RE-059/98
Brazil Facenda Rodeio 1998 (Jaete Bintje)		480 SC	0.29	0.048	4	Thiacloprid only: Tuber	21	< <u>0.02</u>	Lancas, F. M. 1998d RE-059/98

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Ushiku  1997 (Danshaku)	30 WG	0.3	0.015	3	Thiacloprid: Tuber, washed	0 <sup>2</sup>	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )	Anon. 1997p, 1997q, 1997r, 1997s	
						7	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						14	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						21	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
					Thiacloprid-amide: Tuber, washed	0 <sup>2</sup>	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						7	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						14	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						21	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
Japan, Hiroshima  1997 (Nourin No. 1)	30 WG	0.3	0.015	3	Thiacloprid: Tuber, washed	0 <sup>2</sup>	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )	Anon. 1997p, 1997q, 1997r, 1997s	
						7	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						14	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		
						21	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
						Thiacloprid-amide: Tuber, washed	0 <sup>2</sup>  7  14  21	< 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>3</sup> , < 0.005 <sup>3</sup> , ( <u>&lt; 0.005</u> )		

1 Determined as 6-CAN

2 sampling before last application

3 replicate analysis

### Cereals

Table 56. Thiacloprid residues resulting from foliar application to wheat.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.	
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues			
Germany Burscheid  2000 (Lavett)		480 SC	0.062	0.021	2	Ear	-1 0 7 14	< 0.02 0.69 0.15 0.08	Schoening, R. and Eberhardt, R. 2001 RA-2120/00		
					Rest of Plant	-1 0 7 14	< 0.02 <u>1.3</u> 0.15 0.09				
					Grain	21 29	< <u>0.02</u> < 0.02				
					Straw	21 29	0.11 <u>0.14</u>				
France La Chapelle Vendomoise  2000 (Florence Aurore)		480 SC	0.067 0.069	0.021 0.022	2	Ear	0 <sup>1</sup> 0 7 14	0.16 0.83 0.36 0.51		Schoening, R. and Eberhardt, R. 2001 RA-2120/00	
					Rest of Plant	0 <sup>1</sup> 0 7 14	0.53 <u>1.9</u> 0.54 0.70				
					Grain	21	< <u>0.02</u>				
					Straw	21	<u>0.53</u>				

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Germany Monheim  2000 (Lavett)		480 SC	0.062	0.021	2	Ear	0 21	0.58 0.05	Schoening, R. and Eberhardt, R. 2001 RA-2120/00	
					Rest of Plant	0 21	<u>1.7</u> 0.05			
					Grain	30	< <u>0.02</u>			
					Straw	30	<u>0.07</u>			
France Villexanton  2000 (Lloyd)		480 SC	0.066 0.062	0.022 0.021	2	Ear	0	0.84	Schoening, R. and Eberhardt, R. 2001 RA-2120/00	
					Rest of Plant	0	<u>1.3</u>			
					Grain	21	<u>0.04</u>			
					Straw	21	<u>0.89</u>			
France Montamat  2000 (Apache)		480 SC	0.062	0.021	2	Ear	0 <sup>1</sup> 0 7	0.20, 0.18 (0.19) 0.87, 0.88 (0.88) 1.4, 1.3 (1.4)	Schoening, R. and Sur, R. 2001 RA-2121/00	
					Rest of Plant	0 <sup>1</sup> 0 7	0.25, 0.23 (0.24) 1.9, 1.8 (1.9) 2.4, 1.9 ( <u>2.2</u> )			
					Grain	14 22	0.02, < 0.02 (0.02) 0.03, 0.03 ( <u>0.03</u> )			
					Straw	14 22	1.6, 1.6 ( <u>1.6</u> ) 1.4, 1.4 (1.4)			
France Martres  2000 (Sidéral)		480 SC	0.062	0.021	2	Ear	0 <sup>1</sup>	1.1		Schoening, R. and Sur, R. 2001 RA-2121/00
					Rest of Plant	0	<u>1.8</u>			
					Grain	20	<u>0.03</u>			
					Straw	20	<u>0.97</u>			
Germany Burscheid  2002 (Picolo)		110 OD	0.05	0.017	2	Ear	0 <sup>1</sup> 0 21	0.04 0.43 0.03	Schoening, R. 2004 RA/2177/02	
					Rest of Plant	0 <sup>1</sup> 0 21	0.03 <u>1.2</u> 0.04			
					Grain	35	< <u>0.02</u>			
					Straw	35	<u>0.07</u>			

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
France Pithienvile  2002 (Apache)		110 OD	0.05	0.017	2	Ear	0 <sup>1</sup> 0	0.2 0.71	Schoening, R. 2004 RA-2177/02
						Rest of Plant	0 <sup>1</sup> 0	0.6 <u>1.8</u>	
						Grain	21 35	<u>0.04</u> < 0.02	
						Straw	21 35	<u>1.7</u> 0.96	
Germany Burscheid  2002 (Picolo)		110 OD	0.05	0.017	1	Ear	0 21	0.36 0.04	Schoening, R. 2004a RA-2177/02
						Rest of Plant	0 21	<u>1.3</u> 0.04	
						Grain	35	< <u>0.02</u>	
						Straw	35	<u>0.06</u>	
France Pithienvile  2002 (Apache)		110 OD	0.05	0.017	1	Ear	0	0.55	Schoening, R. 2004a RA-2178/02
						Rest of Plant	0	<u>1.2</u>	
						Grain	21 35	<u>0.03</u> 0.02	
						Straw	21 35	<u>1.2</u> 0.56	

1 sampling before last application

Table 57. Thiacloprid residues resulting from foliar application to barley.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.							
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues								
Germany Burscheid  2000 (Baronesse)		480 SC	0.062	0.021	2	Ear	0 <sup>1</sup> 0 6 14	< 0.02 0.90 0.11 0.08	Schoening, R. and Eberhardt, R. 2002 RA-2122/00							
						Rest of Plant	0 <sup>1</sup> 0 6 14	0.04 1.5 0.18 0.06								
						Grain	22 29	0.03 <u>0.06</u>								
						Straw	22 29	0.05 <u>0.07</u>								
						France Monnaie  2000 (Prisma)		480 SC		0.062	0.021 0.019	2	Ear	0 <sup>1</sup> 0 8 14	0.53 2.6 0.61 0.36	Schoening, R. and Eberhardt, R. 2002 RA-2122/00
													Rest of Plant	0 <sup>1</sup> 0 8 14	1.8 3.4 1.6 0.44	
													Grain	21	<u>0.12</u>	



Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
						Grain	39	< 0.001 <sup>1</sup>		
						Husk	39	< 0.001 <sup>1</sup>		
						Straw	39	< 0.001 <sup>1</sup>		
		240 SC	0.18		1	Whole plant w/o roots	0 1 3 7 15 30	9.1 8.96 7.99 4.9 2.9 < 0.001 <sup>1</sup>	Season-I, Replicate 3	
						Grain	39	< 0.001 <sup>1</sup>		
						Husk	39	< 0.001 <sup>1</sup>		
						Straw	39	< 0.001 <sup>1</sup>		
India Chakdaha  2000 (Swama masuri)		240 SC	0.36		1	Whole plant w/o roots	0 1 3 7 15 30	18.9 15.98 15.1 10.9 3.7 < 0.001 <sup>1</sup>	Anon. 2002 India-Rice-2002  Season-I, Replicate 1	
		240 SC	0.36		1	Straw	39	< 0.001 <sup>1</sup>		
						Whole plant w/o roots	0 1 3 7 15 30	17.4 16.8 11.6 8.8 4.0 < 0.001 <sup>1</sup>	Season-I, Replicate 2	
						Grain	39	< 0.001 <sup>1</sup>		
						Husk	39	< 0.001 <sup>1</sup>		
		240 SC	0.36		1	Straw	39	< 0.001 <sup>1</sup>		
						Whole plant w/o roots	0 1 3 7 15 30	16.1 14.3 14.0 10.1 6.9 < 0.001 <sup>1</sup>	Season-I, Replicate 3	
						Grain	39	< 0.001 <sup>1</sup>		
						Husk	39	< 0.001 <sup>1</sup>		
						Straw	39	< 0.001 <sup>1</sup>		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
India Chakdaha  2000 (Khitish)	240 SC	0.18		1	Whole plant w/o roots	0	11.1	Anon. 2002 India-Rice-2002  Season-II, Replicate 1	
						1	8.7		
						3	8.2		
						7	4.5		
						15	2.7		
						30	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
	240 SC	0.18		1	Straw Whole plant w/o roots	0	8.9	Season-II, Replicate 2	
						1	9.1		
						3	7.4		
						7	5.9		
						15	5.2		
						30	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
240 SC	0.18		1	Straw Whole plant w/o roots	0	9.99	Season-II, Replicate 3		
					1	10.1			
					3	8.5			
					7	6.9			
					15	3.2			
					30	< 0.001 <sup>1</sup>			
					29	< 0.001 <sup>1</sup>			
					29	< 0.001 <sup>1</sup>			
					29	< 0.001 <sup>1</sup>			
India Chakdaha  2000 (Khitish)	240 SC	0.36		1	Whole plant w/o roots	0	19.5	Anon. 2002 India-Rice-2002  Season-II, Replicate 1	
						1	17.9		
						3	12.6		
						7	11.9		
						15	4.9		
						30	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
	240 SC	0.36		1	Straw Whole plant w/o roots	0	16.6	Season-II, Replicate 2	
						1	14.9		
						3	15.3		
						7	9.1		
						15	6.2		
						30	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		
						29	< 0.001 <sup>1</sup>		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
		240 SC	0.36		1	Whole plant w/o roots	0 1 3 7 15 30	17.0 17.5 16.3 12.3 5.9 < 0.001 <sup>1</sup>	Season-II, Replicate 3	
						Grain	29	< 0.001 <sup>1</sup>		
						Husk	29	< 0.001 <sup>1</sup>		
						Straw	29	< 0.001 <sup>1</sup>		
India Chakdaha  2001 (Swama masuri)		240 SC	0.18		1	Whole plant w/o roots	0 1 3 7 15 30	8.98 8.4 8.5 5.3 2.5 < 0.001 <sup>1</sup>	Anon. 2002 India-Rice-2002  Season-III, Replicate 1	
		240 SC	0.18		1	Grain	44	< 0.001 <sup>1</sup>		
						Husk	44	< 0.001 <sup>1</sup>		
		240 SC	0.18		1	Straw	44	< 0.001 <sup>1</sup>		
						Whole plant w/o roots	0 1 3 7 15 30	10.96 7.1 7.9 6.7 3.9 < 0.001 <sup>1</sup>	Season-III, Replicate 2	
						Grain	44	< 0.001 <sup>1</sup>		
						Husk	44	< 0.001 <sup>1</sup>		
						Straw	44	< 0.001 <sup>1</sup>		
		240 SC	0.18		1	Whole plant w/o roots	0 1 3 7 15 30	9.8 10.7 6.6 4.98 3.6 < 0.001 <sup>1</sup>	Season-III, Replicate 3	
						Grain	44	< 0.001 <sup>1</sup>		
						Husk	44	< 0.001 <sup>1</sup>		
						Straw	44	< 0.001 <sup>1</sup>		
India Chakdaha  2001 (Swama masuri)		240 SC	0.36		1	Whole plant w/o roots	0 1 3 7 15 30	16.7 14.2 13.96 10.2 3.4 < 0.001 <sup>1</sup>	Anon. 2002 India-Rice-2002  Season-III, Replicate 1	
						Grain	44	< 0.001 <sup>1</sup>		
						Husk	44	< 0.001 <sup>1</sup>		
						Straw	44	< 0.001 <sup>1</sup>		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.	
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues			
		240 SC	0.36		1	Whole plant w/o roots	0 1 3 7 15 30	15.9 16.6 12.2 8.4 5.0 < 0.001 <sup>1</sup>	Season-III, Replicate 2		
						Grain	44	< 0.001 <sup>1</sup>			
						Husk	44	< 0.001 <sup>1</sup>			
		240 SC	0.36		1	Straw Whole plant w/o roots	44 0 1 3 7 15 30	< 0.001 <sup>1</sup> 18.1 14.7 14.8 12.0 5.5 < 0.001 <sup>1</sup>		Season-III, Replicate 3	
						Grain	44	< 0.001 <sup>1</sup>			
						Husk	44	< 0.001 <sup>1</sup>			
						Straw	44	< 0.001 <sup>1</sup>			

<sup>1</sup> limit of detection

Table 59: Thiacloprid residues resulting from granular application to rice.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Japan Miyagi  1997 (Sasanishiki)		GR, 15	1.5	-	1	Thiacloprid: Grain	0 <sup>1</sup>  152	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> )	Anon. 1997t, 1997u, 1997v, 1997w	
						Thiacloprid-amide: Grain	0 <sup>1</sup>  152	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> )		
Japan, Kagoshima  1997 (Koshihikari)		GR, 15	1.5	-	1	Thiacloprid: Grain	0 <sup>1</sup>  117	< 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> ) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> ( <u>&lt; 0.005</u> )	Anon. 1997t, 1997u, 1997v, 1997w	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
						Thiacloprid-amide: Grain	0 <sup>1</sup>  117	(< 0.005)  < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005) < 0.005, < 0.005, < 0.005 <sup>2</sup> , < 0.005 <sup>2</sup> (< 0.005)		

1 sampling before last application

2 replicate analysis

Table 60. Thiacloprid residues resulting from foliar application to maize.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
France Saint Symphorien d'Annelles  2004 (Texxud)		110 OD	0.075	0.025	2	Green material	0 <sup>1</sup> 0 2 7 21	0.31 1.7 0.89 0.76 0.56	Diot, R. 2005 RA-2512/04	
						Ear, corn	0 <sup>1</sup> 0 2 7 21	< 0.01 < 0.01 < 0.01 < 0.01 < 0.01		
						Kernel	30	< 0.01		
Germany Leverkusen  2004 (Justine)		110 OD	0.075	0.025	2	Green material	0 <sup>1</sup> 0 2 7 21	< 0.05 0.90 0.18 0.10 < 0.05	Diot, R. 2005 RA-2512/04	
						Ear, corn	0 <sup>1</sup> 0 2 7 21	< 0.01 0.03 <u>0.03</u> 0.02 0.01		
						Kernel	30	< 0.01		
Germany Gersthofen  2004 (Banguy)		110 OD	0.075	0.025	2	Green material	0 <sup>1</sup> 0 2 7 22	0.21 0.85 0.67 0.42 0.28	Diot, R. 2005 RA-2512/04	
						Ear, corn	0 <sup>1</sup> 0 2 7 22	0.01 0.02 <u>0.04</u> 0.03 0.04		
						Kernel	31	< 0.01		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
France Bacquepuis  2004 (Anjou 285)	110 OD	0.075	0.025	2	Green material	0 <sup>1</sup>	0.17	Diot, R. 2005 RA-2512/04		
						0	0.87			
						2	0.81			
						7	0.55			
						21	0.66			
						21	0.66			
					Ear, corn	0 <sup>1</sup>	< 0.01			
						0	0.02			
						2	<u>0.03</u>			
						7	0.02			
						21	0.02			
						21	0.02			
France Ambérieux  2004 (34B23)	110 OD	0.075	0.025	2	Green material	0 <sup>1</sup>	0.33	Diot, R. 2005a RA-2511/04		
						0	1.7			
						3	1.7			
						7	1.1			
						22	0.58			
						22	0.58			
					Ear, corn	0 <sup>1</sup>	< 0.01			
						0	< 0.01			
						3	< <u>0.01</u>			
						7	< 0.01			
						22	< 0.01			
						22	< 0.01			
Spain Vila-sacra  2004 (PR32R42)	110 OD	0.075	0.025	2	Green material	0 <sup>1</sup>	0.12	Diot, R. 2005a RA-2511/04		
						0	0.46			
						3	0.36			
						7	0.32			
						21	0.10			
						21	0.10			
					Ear, corn	0 <sup>1</sup>	< 0.01			
						0	< 0.01			
						3	< <u>0.01</u>			
						7	< 0.01			
						21	< 0.01			
						21	< 0.01			
Italy Albaro Di Ronco All'Adige  2004 (PR-33-A46)	110 OD	0.075	0.025	2	Green material	0 <sup>1</sup>	0.14	Diot, R. 2005a RA-2511/04		
						0	0.74			
						3	0.71			
						7	0.63			
						21	0.13			
						21	0.13			
					Ear, corn	0 <sup>1</sup>	< 0.01			
						0	< 0.01			
						3	< <u>0.01</u>			
						7	< 0.01			
						21	< 0.01			
						21	< 0.01			
Kernel	28	< 0.01								
	28	< 0.01								

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Greece Xehasmeni- Imathias  2004 (Brasco)		110 OD	0.075	0.025	2	Green material	0 <sup>1</sup>	0.62	Diot, R. 2005a RA-2511/04
							0	1.9	
							2	1.2	
							7	1.3	
							21	1.8	
						Ear, corn	0 <sup>1</sup>	0.04, 0.04, 0.03 (0.04)	
							0	0.16, 0.15, 0.15 (0.15)	
							2	0.08, 0.07, 0.08 (0.08)	
							7	0.11, 0.11, 0.11 (0.11)	
							21	0.14, 0.12, 0.12 (0.13)	
						Kernel	31	< 0.01	

1 sampling before last application

### Nuts and seeds

Table 61. Thiacloprid residues resulting from foliar application to walnuts.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Italy Villadose  2003 (Lara)		480 SC	0.17 0.19	0.03 0.03	2	Nutmeat	0	< 0.005	Baravelli, P. L. 2003 AGRI012/03DEC
							3	< 0.005	
							7	< 0.005	
							14	< 0.005	
Italy Villadose  2003 (Lara)		480 SC	0.17 0.19	0.03 0.03	2	Nutmeat	0	< 0.005	Baravelli, P. L. 2003 AGRI012/03DEC
							3	< 0.005	
							7	< 0.005	
							14	< 0.005	
Italy San Dona di Piave  2003 (Lara)		480 SC	0.19 0.19	0.03 0.03	2	Nutmeat	0	< 0.005	Baravelli, P. L. 2003 AGRI012/03DEC
							3	< 0.005	
							7	< 0.005	
							14	< 0.005	
Italy San Dona di Piave  2003 (Lara)		480 SC	0.19 0.19	0.03 0.03	2	Nutmeat	0	< 0.005	Baravelli, P. L. 2003 AGRI012/03DEC
							3	< 0.005	
							7	< 0.005	
							14	< 0.005	

Table 62. Thiacloprid residues resulting from foliar application to almonds

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA California  2000 (Monterey)	480 SC	0.14 0.15 0.15	0.029	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>1.4</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	1.4		
USA California, Kerman  2000 (Monterey)	480 SC	0.14 0.14 0.14	0.005	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>1.5</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	1.5		
USA California, Hughson  2000 (Merced)	480 SC	0.14 0.14 0.15	0.028 0.028 0.029	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>0.99</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	1.0		
USA California, Hughson  2000 (Merced)	480 SC	0.14 0.14 0.14	0.006 0.006 0.007	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>1.3</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	1.3		
USA California, Porterville  2000 (Mission)	480 SC	0.14 0.14 0.14	0.025 0.026 0.025	3	Thiacloprid only: Nutmeat	10	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	10	<u>2.1</u>		
					Total residue <sup>1</sup> : Nutmeat	10	< 0.01		
					Hulls	10	2.1		
USA California, Porterville  2000 (Mission)	480 SC	0.14 0.14 0.14	0.006 0.006 0.007	3	Thiacloprid only: Nutmeat	10	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	10	<u>1.8</u>		
					Total residue <sup>1</sup> : Nutmeat	10	< 0.01		
					Hulls	10	1.8		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA California, Glenn  2000 (Non-Pareil)	480 SC	0.14 0.14 0.14	0.038 0.038 0.033	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>1.8</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	1.8		
USA California, Glenn  2000 (Non-Pareil)	480 SC	0.14	0.007	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>3.4</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	3.4		
USA California, Glenn  2000 (Non-Pareil)	70 WG	0.14 0.14 0.14	0.038 0.038 0.033	3	Thiacloprid only: Nutmeat	14	<u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>2.0</u>		
					Total residue <sup>1</sup> : Nutmeat	14	0.01		
					Hulls	14	2.0		
USA California, Glenn  2000 (Non-Pareil)	70 WG	0.14	0.007	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307	
					Hulls	14	<u>4.9</u>		
					Total residue <sup>1</sup> : Nutmeat	14	< 0.01		
					Hulls	14	4.9		
USA California, Terra Bella  2000 (Monterey)	480 SC	0.14	0.022	3	Thiacloprid only: Nutmeat	8	< 0.01	Harbin, A. M. 2004 110307	
						14	< <u>0.01</u>		
						20	< 0.01		
						23	< 0.01		
					Hulls	8	2.3		
						14	<u>3.3</u>		
						20	2.8		
						23	1.8		
					Total residue <sup>1</sup> : Nutmeat	8	< 0.01		
						14	< 0.01		
						20	< 0.01		
						23	< 0.01		
Hulls	8	2.3							
	14	3.3							
	20	2.8							
	23	1.8							

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
USA California, Terra Bella  2000 (Monterey)	480 SC	0.14	0.007	3	Thiacloprid only: Nutmeat	8	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	3.8			
						14	3.7			
						20	<u>4.5</u>			
						23	2.4			
					Total residue <sup>1</sup> : Nutmeat	8	< 0.01			
						14	< 0.01			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	3.8			
						14	3.7			
						20	4.6			
						23	2.5			
USA California, Terra Bella  2000 (Monterey)	70 WG	0.14	0.022	3	Thiacloprid only: Nutmeat	8	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	2.0			
						14	<u>3.2</u>			
						20	2.6			
						23	1.4			
					Total residue <sup>1</sup> : Nutmeat	8	< 0.01			
						14	< 0.01			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	2.1			
						14	3.2			
						20	2.6			
						23	1.4			
USA California, Terra Bella  2000 (Monterey)	70 WG	0.14	0.007	3	Thiacloprid only: Nutmeat	8	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	2.4			
						14	<u>3.3</u>			
						20	2.4			
						23	2.3			
					Total residue <sup>1</sup> : Nutmeat	8	< 0.01			
						14	< 0.01			
						20	< 0.01			
						23	< 0.01			
					Hulls	8	2.4			
						14	3.4			
						20	2.4			
						23	2.4			

<sup>1</sup> Determined as sum of thiacloprid, thiacloprid -amide and 4-hydroxy-thiacloprid-amide

Table 63. Thiacloprid residues resulting from foliar application to pecan.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
USA Georgia, Chula	2000 (Summer)	480 SC	0.14 0.15 0.14	0.023 0.027 0.025	3	Thiacloprid only: Nutmeat	13	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	13	< 0.01	
USA Georgia, Chula	2000 (Summer)	480 SC	0.14 0.14 0.14	0.004 0.005 0.005	3	Thiacloprid only: Nutmeat	13	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	13	< 0.01	
USA Louisiana, Alexandria	2000 (Cape Fear)	480 SC	0.14	0.029	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Louisiana, Alexandria	2000 (Cape Fear)	480 SC	0.14	0.006	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Louisiana, Alexandria	2000 (Cape Fear)	70 WG	0.14	0.029	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Louisiana, Alexandria	2000 (Cape Fear)	70 WG	0.14	0.006	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Texas, Boling	2000 (Choctaw)	480 SC	0.14	0.029	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Texas, Boling	2000 (Choctaw)	480 SC	0.14	0.006	3	Thiacloprid only: Nutmeat	14	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	14	< 0.01	
USA Texas, Uvalde	2000 (Stuart)	480 SC	0.14 0.14 0.15	0.033 0.035 0.033	3	Thiacloprid only: Nutmeat	12	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	12	< 0.01	
USA Texas, Uvalde	2000 (Stuart)	480 SC	0.14	0.007	3	Thiacloprid only: Nutmeat	12	< <u>0.01</u>	Harbin, A. M. 2004 110307
						Total residue <sup>1</sup> : Nutmeat	12	< 0.01	

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
USA Georgia, Albany  2000 (Stuart)	480 SC	0.14 0.14 0.14	0.027 0.029 0.027	3	Thiacloprid only: Nutmeat	9	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						19	< 0.01			
						23	< 0.01			
					Total residue <sup>1</sup> : Nutmeat	9	< 0.01			
						14	< 0.01			
						19	< 0.01			
						23	< 0.01			
USA Georgia, Albany  2000 (Stuart)	480 SC	0.14	0.005	3	Thiacloprid only: Nutmeat	9	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						19	< 0.01			
						23	< 0.01			
					Total residue <sup>1</sup> : Nutmeat	9	< 0.01			
						14	< 0.01			
						19	< 0.01			
						23	< 0.01			
USA Georgia, Albany  2000 (Stuart)	70 WG	0.14 0.14 0.14	0.027 0.029 0.027	3	Thiacloprid only: Nutmeat	9	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						19	< 0.01			
						23	< 0.01			
					Total residue <sup>1</sup> : Nutmeat	9	< 0.01			
						14	< 0.01			
						19	< 0.01			
						23	< 0.01			
USA Georgia, Albany  2000 (Stuart)	70 WG	0.14	0.005	3	Thiacloprid only: Nutmeat	9	< 0.01	Harbin, A. M. 2004 110307		
						14	< <u>0.01</u>			
						19	< 0.01			
						23	< 0.01			
					Total residue <sup>1</sup> : Nutmeat	9	< 0.01			
						14	< 0.01			
						19	< 0.01			
						23	< 0.01			

<sup>1</sup> Determined as sum of thiacloprid, thiacloprid -amide and 4-hydroxy-thiacloprid-amide

## Oilseeds

Table 64. Thiacloprid residues resulting from foliar application to oilseed rape.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Hungary Kaposvár-Dénes- major  2000 (Valeska)		480 SC	0.096	0.031	1	Seed	31	0.02, < 0.02, < 0.02 ( <u>0.02</u> )	Orosz, F. 2000b 00-BAY-AA-14-04
France Villettes  2001 (Pollen)		240 OD	0.096	0.032	1	Green material	0	<u>1.0</u>	Schoening, R. 2002e RA-2171/01
					Straw	30	0.25		
					Seed	30	<u>0.07</u>		
Germany Burscheid  2001 (Express)		240 OD	0.096	0.032	1	Green material	0	<u>1.6</u>	Schoening, R. 2002e RA-2171/01
					Pod	7 14	1.4 0.50		
					Rest of Plant	7 14	0.71 0.08		
					Seed	22 29 33	<u>0.06</u> 0.05 0.04		
					Straw	29	0.28		
Germany Burscheid  2002 (Licondor)		240 OD	0.12	0.04	1	Pod	0	2.6	Billian, P. and Schoening, R. 2003d RA-2025/02
					Rest of Plant	0	<u>2.2</u>		
					Seed	31	< <u>0.02</u>		
					Straw	31	0.18		
France Etrepagny  2002 (Zenith)		240 OD	0.12	0.04	1	Pod	0 7 14 22	1.9 0.31 0.22 0.18	Billian, P. and Schoening, R. 2003d RA-2025/02
					Rest of Plant	0 7 14 22	<u>1.1</u> 0.17 0.08 0.04		
					Seed	30 35	< <u>0.02</u> < 0.02		
					Straw	30	0.31		
Sweden Dalby  2002 (Stratos)		240 OD	0.12	0.04	1	Pod	0	3.1	Billian, P. and Schoening, R. 2003d RA-2025/02
					Rest of Plant	0	<u>1.9</u>		
					Seed	29	<u>0.05</u>		
					Straw	29	0.07		

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Germany Boerrstadt  2002 (Capitol)	240 OD	0.12	0.04	1	Pod	0	2.2	Billian, P. and Schoening, R. 2003d RA-2025/02	
					Rest of Plant	0	<u>1.4</u>		
					Seed	30	<u>0.07</u>		
					Straw	30	0.40		
France Chambourg  2002 (Pollen)	240 OD	0.12	0.04	1	Pod	0	0.58	Billian, P. and Schoening, R. 2003d RA-2025/02	
						7	0.85		
						14	0.60		
						21	0.66		
					Rest of Plant	0	<u>1.5</u>		
						7	0.12		
						14	0.05		
						21	0.04		
Germany Worms- Heppenheim  2002 (Zenith)	240 OD	0.12	0.04	1	Pod	0	2.1	Billian, P. and Schoening, R. 2003d RA-2025/02	
						7	1.1		
						14	0.69		
					Rest of Plant	0	<u>1.1</u>		
						7	0.30		
						14	0.13		
					Seed	21	<u>0.22</u>		
						29	0.16		
	33	0.18							
Spain Vilademuls  2001 (Fabiola)	240 OD	0.12	0.032	1	Green material	0	<u>1.7</u>	Schoening, R. 2002f RA-2172/01	
						30	0.14		
					Seed	40	<u>0.09</u>		
France Varennes  2001 (Constant)	240 OD	0.088	0.032	1	Straw	40	0.17	Schoening, R. 2002f RA-2172/01	
					Green material	0	<u>1.2</u>		
					Pod	7	0.54		
						14	0.76		
					Rest of Plant	7	0.18		
						14	0.15		
					Seed	21	0.06		
						29	0.05		
						34	<u>0.07</u>		
					Straw	29	0.95		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Vilobi D'Onyar  2001 (Fabiola)		240 OD	0.12	0.04	1	Pod	0	2.5	Billian, P. and Schoening, R. 2003e RA-2026/02	
							7	1.4		
							13	1.2		
							20	1.4		
						Rest of Plant	0	<u>1.1</u>		
							7	0.38		
							13	0.22		
							20	0.17		
						Seed	30	<u>0.33</u>		
							34	0.30		
						Straw	30	0.87		
						France Boulouc  2002 (Olara)		240 OD		0.11
Rest of Plant	0	<u>1.1</u>								
Seed	30	<u>0.03</u>								
Straw	30	0.10								

Single underlined values were used for the evaluation of rape forage

Double underlined values were used for the evaluation of rape seed and white mustard seed

Table 65. Thiacloprid residues resulting from foliar application to cotton.

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Coria del Rio  1997 (Bravo)		480 SC	0.096	0.019	3	Thiacloprid only: Seed	21	< <u>0.02</u>	Schoening, R. and Sur, R. 2000a RA-2115/97	
						Total residue <sup>1</sup> : Seed	21	0.94		
Spain Coria del Rio  1997 (Bravo)		480 SC	0.096	0.019	3	Thiacloprid only: Seed	21	< <u>0.02</u>	Schoening, R. and Sur, R. 2000a RA-2115/97	
						Total residue <sup>1</sup> : Seed	21	1.1		
Greece Alexandria  1997 (Tempra)		480 SC	0.096	0.0096	3	Thiacloprid only: Seed	20	< <u>0.02</u>	Schoening, R. and Sur, R. 2000a RA-2115/97	
						Total residue <sup>1</sup> : Seed	20	1.4		
Greece Alexandria  1997 (Bravo)		480 SC	0.096	0.096	3	Thiacloprid only: Seed	21	< <u>0.02</u>	Schoening, R. and Sur, R. 2000a RA-2115/97	
						Total residue <sup>1</sup> : Seed	21	2.0		
Spain Palomares  1998 (Bravo)		480 SC	0.096	0.019	3	Thiacloprid only: Seed	21	< <u>0.02</u>	Schoening, R. and Sur, R. 2000b RA-2073/98	
						Total residue <sup>1</sup> : Seed	21	0.76		

Location (variety)	Year	Form	Application			Analysis			Reference, No.	Report
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues		
Spain Palomares	1998 (Bravo)	480 SC	0.096	0.019	3	Thiacloprid only: Seed	21	< 0.02	Schoening, R. and Sur, R. 2000b RA-2073/98	Replicate 2
						Total residue <sup>1</sup> : Seed	21	1.0		
Greece Trikala	1998 (Bravo)	480 SC	0.096	0.0096	3	Thiacloprid only: Seed	21	< 0.02	Schoening, R. and Sur, R. 2000b RA-2073/98	
						Total residue <sup>1</sup> : Seed	21	1.7		
Greece Alexandria	1998 (Bravo)	480 SC	0.096	0.0096	3	Thiacloprid only: Seed	21	< 0.02	Schoening, R. and Sur, R. 2000b RA-2073/98	
						Total residue <sup>1</sup> : Seed	21	0.83		
USA Louisiana, Cheneyville	1997 (Delta and Pine Land)	480 SC	0.11	0.12	3	Total residue <sup>1</sup> : Seed	13	0.24, 0.33 (0.29)	Koch, A. 1999 109011	
						Gintrash	13	9.5, 10.7 (10.1)		
USA Louisiana, Cheneyville	1997 (Delta and Pine Land)	70 WG	0.11	0.12	3	Total residue <sup>1</sup> : Seed	13	0.46, 0.42 (0.44)	Koch, A. 1999 109011	
						Gintrash	13	9.4, 8.6 (9.0)		
USA Arkansas, Shoffner	1997 (Suregrow 125)	480 SC	0.11	0.15	3	Total residue <sup>1</sup> : Seed	15	0.49, 0.38 (0.44)	Koch, A. 1999 109011	
						gintrash	15	10.9, 8.2 (9.6)		
USA Arkansas, Shoffner	1997 (Suregrow 125)	70 WG	0.11	0.15	3	Total residue <sup>1</sup> : Seed	15	0.23, 0.21 (0.22)	Koch, A. 1999 109011	
						Gintrash	15	8.6, 9.2 (8.9)		
USA Texas, Bernard	1997 (Deltapine 33B)	480 SC	0.11	0.12	3	Total residue <sup>1</sup> : Seed	14	0.84, 0.62 (0.73)	Koch, A. 1999 109011	
USA Texas, Bernard	1997 (Deltapine 33B)	70 WG	0.11	0.12	3	Total residue <sup>1</sup> : Seed	14	0.31, 0.75 (0.53)	Koch, A. 1999 109011	
USA Texas, Floydada	1997 (HS-26)	480 SC	0.11	0.12	3	Total residue <sup>1</sup> : Seed	14	0.09, 0.11 (0.10)	Koch, A. 1999 109011	
USA Texas, Floydada	1997 (HS-26)	70 WG	0.11	0.13	3	Total residue <sup>1</sup> : Seed	14	0.08, 0.08 (0.08)	Koch, A. 1999 109011	



Location (variety)	Year	Form	Application			Analysis			Reference, Report No.		
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues			
USA Mississippi, Benoit  1997 (Deltapine 50)		480 SC	0.11	0.20	3	Total residue <sup>1</sup> :	8	0.11, 0.13 (0.12)	Koch, A. 1999 109011		
						Seed				12	0.09, 0.23 (0.16)
										17	0.26, 0.25 (0.26)
										21	0.46, 0.22 (0.34)
						gintrash				8	3.5, 5.0 (4.3)
										12	3.3, 3.9 (3.6)
										17	2.4, 2.4 (2.4)
										21	2.9, 2.2 (2.6)
USA Mississippi, Benoit  1997 (Deltapine 50)		70 WG	0.11	0.21	3	Total residue <sup>1</sup> :	12	< 0.05, 0.11 (0.08)	Koch, A. 1999 109011		
						Seed				Gintrash	12
USA California, Fresno  1997 (Maxxa)		480 SC	0.11	0.12	3	Total residue <sup>1</sup> :	14	0.34, 0.15 (0.25)	Koch, A. 1999 109011		
USA Georgia, Tifton  1997 (DPL5415)		480 SC	0.11	0.13	3	Total residue <sup>1</sup> :	16	0.48, 0.54 (0.51)	Koch, A. 1999 109011		
USA Georgia, Tifton  1997 (DPL5415)		70 WG	0.11	0.13	3	Total residue <sup>1</sup> :	16	0.49, 0.63 (0.56)	Koch, A. 1999 109011		

<sup>1</sup> determined as 6-CNA

Table 66. Thiacloprid residues resulting from foliar application to sunflowers.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Hungary Fonó Somogy  2000 (Arena)		480 SC	0.097	0.031	1	Seed	30	0.02, 0.03, 0.03 (0.03)	Orosz, F. 2000c 00-BAY-AA-14-05

## Tea

Table 67. Thiacloprid residues resulting from foliar application to green tea.

Location (variety)	Year	Form	Application			Analysis			Reference, Report No.
			kg ai/ha	kg ai/hL	No	Sample	PHI	Residues	
Japan, Mie  1997 (Yabukita)		30 WG	0.3	0.015	1	Thiacloprid: Leaves	0 <sup>1</sup>	< 0.01, < 0.01, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> ( < 0.04)	Fukuda, T. 1998 NR98020
							3	9.9, 9.7, 7.9 <sup>2</sup> , 7.1 <sup>2</sup> (8.2)	
							7	17, 16, 11 <sup>2</sup> , 10 <sup>2</sup> (14)	
							14	5.1, 5.0, 4.3 <sup>2</sup> , 4.0 <sup>2</sup> (4.6)	
					Thiacloprid-amide: Leaves	0 <sup>1</sup>	< 0.01, < 0.01, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> ( < 0.04)		
						3	0.02, 0.01, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> (0.04)		
						7	0.05, 0.05, 0.06, 0.06 (0.06)		
						14	0.02, 0.02, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> (0.04)		
Japan, Miyazaki  1997 (Yamanami)		30 WG	0.3	0.015	1	Thiacloprid: Leaves	0 <sup>1</sup>	< 0.01, < 0.01, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> ( < 0.04)	Fukuda, T. 1998 NR98020
							3	44, 42, 39 <sup>2</sup> , 38 <sup>2</sup> (41)	
							7	19, 19, 15 <sup>2</sup> , 14 <sup>2</sup> (17)	
							14	4.2, 3.9, 2.9 <sup>2</sup> , 2.9 <sup>2</sup> (3.5)	
					Thiacloprid-amide: Leaves	0 <sup>1</sup>	< 0.01, < 0.01, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> ( < 0.04)		
						3	0.07, 0.06, 0.08 <sup>2</sup> , 0.08 <sup>2</sup> (0.07)		
						7	0.07, 0.06, 0.08, 0.08 (0.07)		
						14	0.02, 0.02, < 0.04 <sup>2</sup> , < 0.04 <sup>2</sup> (0.04)		

1 sampling before last application

2 replicate analysis

## FATE OF RESIDUES IN STORAGE AND PROCESSING

### Processing

In hydrolysis experiments designed to simulate typical processing operations (Riegner, K., 1998) [methylene-<sup>14</sup>C]-thiacloprid was incubated in aqueous buffer solutions at a concentration of 0.41 mg/L at 90°C (pH 4 for 20 min), 100°C (pH 5 for 60 min) and 120°C (pH 6 for 20 min) (Table 68).

At zero-time and test termination the samples were analysed by HPLC and by thin-layer chromatography. The content of radioactivity was determined by liquid scintillation counting. Material balances were established at each sampling time.

Table 68. Representative hydrolysis conditions.

Hydrolysis Conditions	Sampling time (min)	Content of thiacloprid
		(% of applied radioactivity *)
pH 4; 90 °C; 20 min.	0	97.6
	20	98.1
pH 5; 100 °C; 60 min.	0	97.0
	60	96.5
pH 6; 120 °C; 20 min.	0	96.9
	20	97.0

After incubation, the radioactivity in the neutralised buffer solutions represented unchanged thiacloprid (96.5–98.1% of the applied radioactivity), demonstrating that no significant hydrolytic degradation had taken place under the simulated processing conditions.

Processing studies on melons and watermelons, apples, peaches, cherries and tomatoes were reported.

### Melons

Residues in melons and watermelons incurred as a result of foliar treatment. The specific trial data is presented in Table 45 and Table 47. As relevant processing step the separation of pulp and peel was investigated. In Table 69 the residues and processing factors for melons and watermelons are summarised.

Table 69. Processing studies on melons.

Location Year (variety)	Sample	PHI	Residues	Processing factor	Reference, Report No.	
<b>MELONS</b>						
Greece Larisa  1995 (Midi Star)	Peel	0 <sup>1</sup>	0.03		Placke, F. J. 1997j RA-2061/95	
		0	0.08	2		
		3	0.02	1		
		7	0.02	1		
		10	< 0.02	nc		
	Pulp	0 <sup>1</sup>	< 0.02			
		0	< 0.02	0.5		
		3	< 0.02	nc		
		7	< 0.02	nc		
		10	< 0.02	nc		
	Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02			
		0	0.04			
		3	< 0.02			
		7	< 0.02			
		10	< 0.02			

Location Year (variety)	Sample	PHI	Residues	Processing factor	Reference, Report No.
Italy Trinitapoli  1995 (Leglend)	Peel	0 <sup>1</sup>	0.02		Placke, F. J. 1997j RA-2061/95
		0	0.23	2.6	
		3	0.08	2.7	
		7	0.05	2.5	
		10	< 0.02	nc	
	Pulp	0 <sup>1</sup>	< 0.02		
		0	< 0.02	0.22	
		3	< 0.02	0.66	
		7	< 0.02	1	
		10	< 0.02	nc	
	Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02		
		0	0.09		
		3	0.03		
		7	0.02		
		10	< 0.02		
Greece Larisa  1996 (Gold Star F1)	Whole fruit	0 <sup>1</sup>	0.04		Placke, F. J. 1997k RA-2118/96
		0	0.05		
		1	0.06		
	Peel	3	0.36	6	
		7	0.28	7	
	Pulp	3	< 0.02	0.33	
		7	< 0.02	0.5	
	Whole fruit <sup>2</sup>	3	0.06		
		7	0.04		
	Italy Lequile  1996 (Galia)	Whole fruit	0 <sup>1</sup>	0.03	
0			0.06		
1			0.06		
Peel		3	0.23	3.8	
		7	0.23	3.8	
Pulp		3	< 0.02	0.33	
		7	< 0.02	0.33	
Whole fruit <sup>2</sup>		3	0.06		
		7	0.06		
France Verlhac7Tescou  2000 (Figaro)		Whole fruit	0	0.07	
		3	0.05		
	Peel	3	0.13	2.6	
	Pulp	3	< 0.02	0.4	
France Sarrians  2000 (Sirio)	Whole fruit	0	0.05		Schoening, R. and Nuesslein, F. 2001b RA-2115/00
		3	0.02		
	Peel	3	0.05	2.5	
	Pulp	3	< 0.02	1	

Location Year (variety)	Sample	PHI	Residues	Processing factor	Reference, Report No.
<b>WATERMELONS</b>					
Greece Larisa  1995 (Crimson Sweet)	Peel	0 <sup>1</sup>	< 0.02		Placke, F. J. 1997j RA-2061/95
		0	0.03	1.5	
		3	< 0.02	nc	
		7	< 0.02	nc	
		10	< 0.02	nc	
	Pulp	0 <sup>1</sup>	< 0.02		
		0	< 0.02	nc	
		3	< 0.02	nc	
		7	< 0.02	nc	
		10	< 0.02	nc	
	Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02		
		0	< 0.02		
		3	< 0.02		
		7	< 0.02		
		10	< 0.02		
Spain Gavá  1995 (Super Sugarbaby)	Peel	0 <sup>1</sup>	0.04		Placke, F. J. 1997j RA-2061/95
		0	0.07	2.3	
		3	0.03	1.5	
		7	< 0.02	nc	
		10	< 0.02	nc	
	Pulp	0 <sup>1</sup>	< 0.02		
		0	< 0.02	0.66	
		3	< 0.02	nc	
		7	< 0.02	nc	
		10	< 0.02	nc	
	Whole fruit <sup>2</sup>	0 <sup>1</sup>	< 0.02		
		0	0.03		
		3	< 0.02		
		7	< 0.02		
		10	< 0.02		
Spain Gavá  1996 (Patanegra)	Whole fruit	0 <sup>1</sup>	< 0.02		Placke, F. J. 1997k RA-2118/96
		0	< 0.02		
		1	< 0.02		
		3	< 0.02		
		7	< 0.02		
	Peel	3	< 0.02	nc	
		7	< 0.02	nc	
	Pulp	3	< 0.02	nc	
		7	< 0.02	nc	
Spain La Almunia  1996 (Meridiam)	Whole fruit	0 <sup>1</sup>	0.03		Placke, F. J. 1997k RA-2118/96
		0	0.08		
		1	0.07		
		3	0.06		
		7	0.06		
	Peel	3	0.10	1.7	
		7	< 0.02	0.33	
	Pulp	3	< 0.02	0.33	
		7	< 0.02	0.33	

nc: pf cannot be calculated

1 treatment before last application

2 calculated value

RAC: raw agricultural commodity

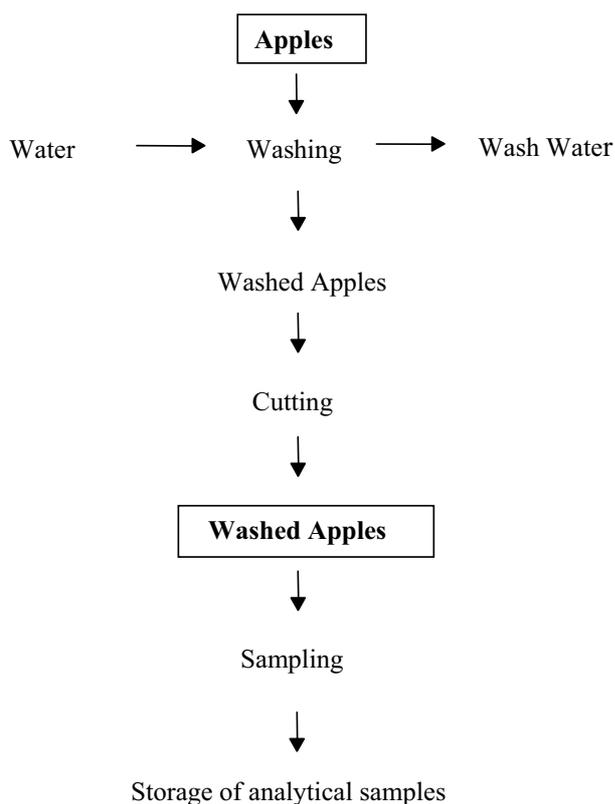
Residues were below the limit of quantification ( $< 0.02$  mg/kg) in melons before processing, but were quantified in peel or pulp. In cases where residues were measurable in processed fractions, transfer values were calculated by taking residues in whole fruits before processing as equal to the LOQ (0.02 mg/kg).

### Apples

Two trials on apples were conducted in Italy and Germany 1995. The application rate was 0.144 kg ai/ha. The water rate was 500 and 1500 L/ha corresponding to a spray concentration of 0.02% or 0.06%, respectively. The two treatments were conducted during fruit development and fruit colouring at an interval of 14 days. The last application was carried out 14 days prior to the expected harvest (recommended waiting period). For processing, apple fruits were taken from the treated and the untreated plot on day 14 (harvest).

The washing of apples was done using domestic practice (see Figure 5). The preparation of dried apples, apple juice, dried pomace and apple sauce simulated the industrial practice at a laboratory scale (see Figures 6, 7 and 8).

The residues of thiacloprid were determined according to method 00419. The recoveries ranged from 77 to 108% at fortification levels of 0.02 and 0.20 mg/kg for fruit, from 92 to 104% at fortification level of 0.02 mg/kg for juice, from 75 to 80% at fortification level of 0.02 mg/kg for pomace, from 88 to 89% at fortification level of 0.02 mg/kg for dried fruit and from 89 to 98% at fortification levels of 0.02 and 0.20 mg/kg for sauce. The limit of quantitation (LOQ) was 0.02 mg/kg.



samples or fractions to be analysed

Figure 5. Flow Diagram for the preparation of washed apples.

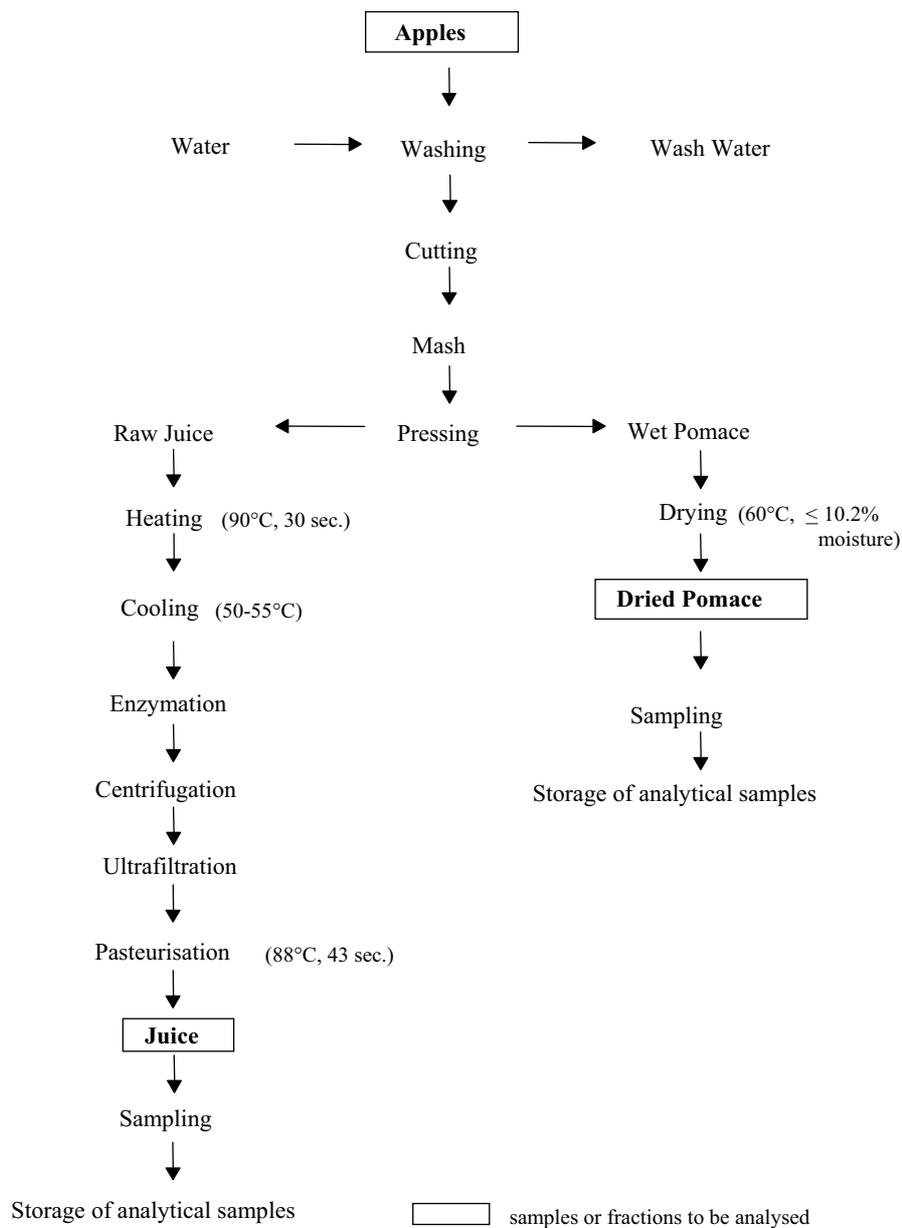


Figure 6. Flow Diagram for the preparation of apple juice and dried pomace.

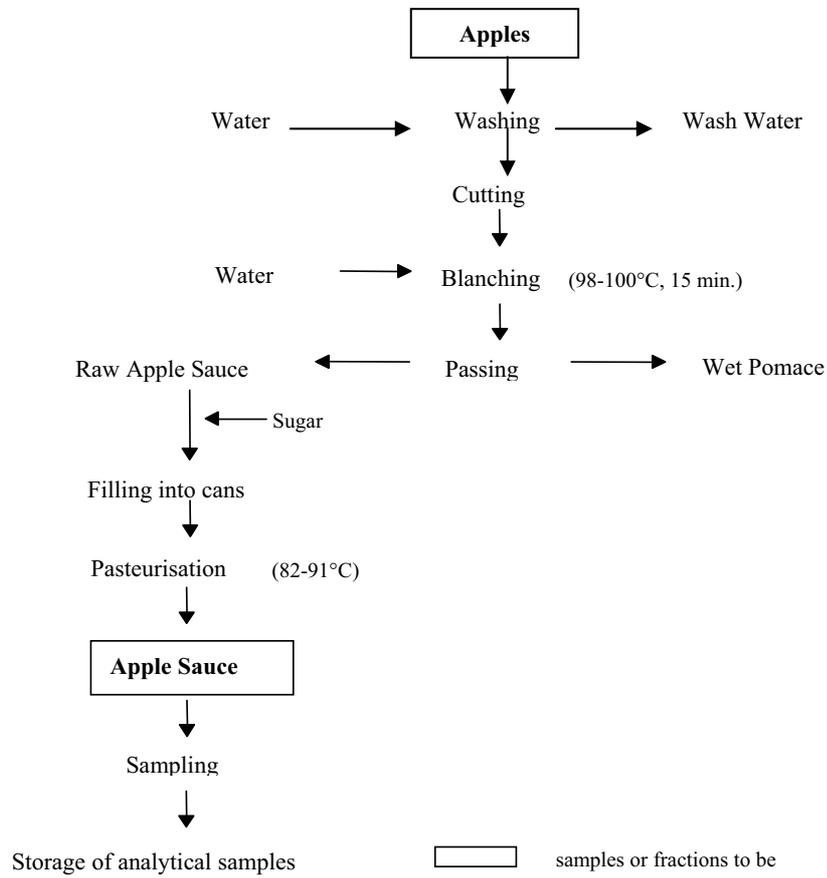
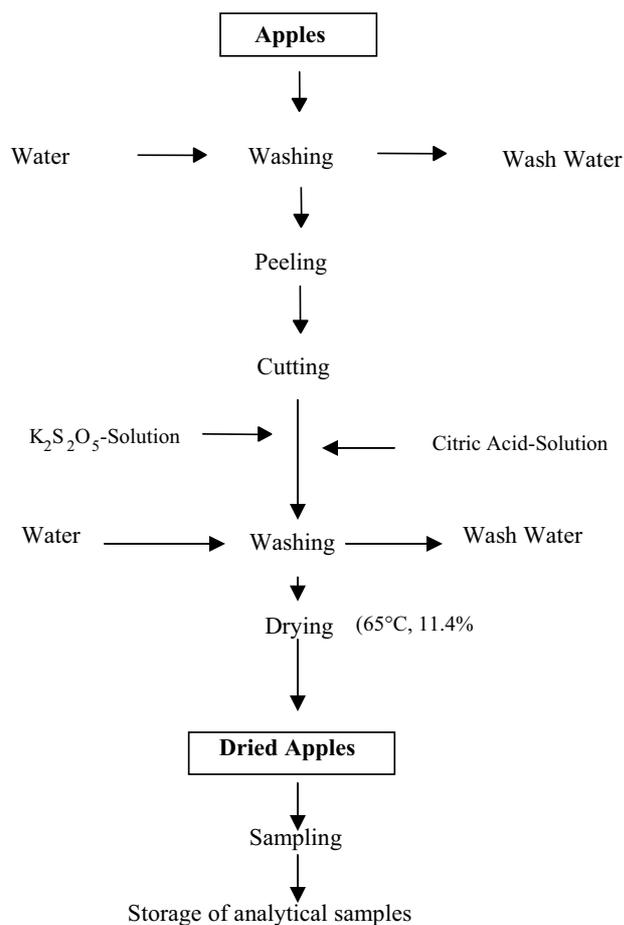


Figure 7. Flow Diagram for the preparation of apple sauce.



samples or fractions to be analysed

Figure 8. Flow Diagram for the preparation of dried apples.

Table 70. Results from processing studies on apple.

Country Year (Variety)	Application					Commodity	Thiacloprid mg/kg	Processing factor	Author Date Report No.
	From	No.	kg ai/ha	kg ai/hL	PHI days				
Italy Laives  1995 (Granny Smith)	480 SC	2	0.14	0.096	14	Fruit (RAC)	0.1		Placke, F. J. 1997t RA-3063/95
						Fruit, washed	0.08, 0.07 (0.08)	0.8	
						Fruit, dried	0.03, 0.02 (0.03)	0.3	
						Juice	0.02, 0.02 (0.02)	0.2	
						Sauce	0.06, 0.05 (0.06)	0.6	
						Pomace, dried	0.42, 0.43 (0.43)	4.3	
Germany Monheim  1995 (Golden Delicious)	480 SC	2	0.14	0.023	14	Fruit (RAC)	0.07		Placke, F. J. 1997u RA-3062/95
						Fruit, washed	0.06, 0.07 (0.07)	1	
						Fruit, dried	0.06, 0.04 (0.05)	0.7	
						Juice	< 0.02, < 0.02 (< 0.02)	0.29	
						Sauce	0.06, 0.06 (0.06)	0.86	
						Pomace, dried	0.63, 0.59 (0.61)	8.7	

RAC: raw agricultural commodity

*Peaches*

Three trials on peaches were performed in Italy and Spain in 1995 and 1996. The application rate was 0.144 kg ai/ha. The water rate was 1500 L/ha corresponding to a spray concentration of 0.02%. The two treatments were conducted during fruit development and fruit colouring at an interval of 14 days. The last application was carried out 14 days prior to the expected harvest (recommended waiting period). All applications were at the required rate. For processing peaches were taken on day 14 from the treated and the untreated plot.

The washing of peaches was done using domestic practice, i.e., washing in standing water and stoning (Figure ). The preparation of peach preserves simulated industrial practice at a laboratory scale (Figure ). For the preparation of preserves, the peaches were washed in standing water, peeled and stoned. The peeled and stoned peaches were filled into 1L preserving cans and a solution of sugar was added. Then the peach preserves were pasteurised at about 90°C. After pasteurisation, the peach preserve was minced in a mixer.

The residues of thiacloprid were determined according to method 00419. The recoveries ranged from 92 to 104% at fortification levels of 0.02 and 0.20 mg/kg for fruit and from 92 to 99% at a fortification level of 0.02 mg/kg for the peach preserve. The limit of quantitation (LOQ) was 0.02 mg/kg.

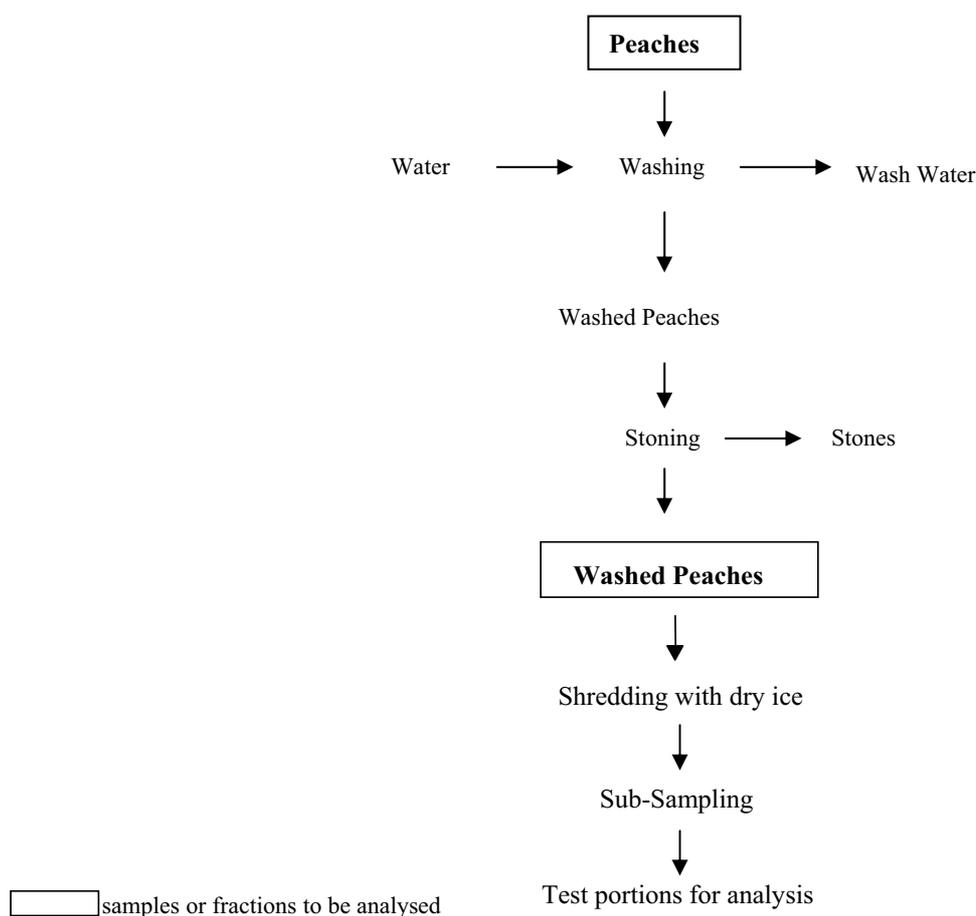
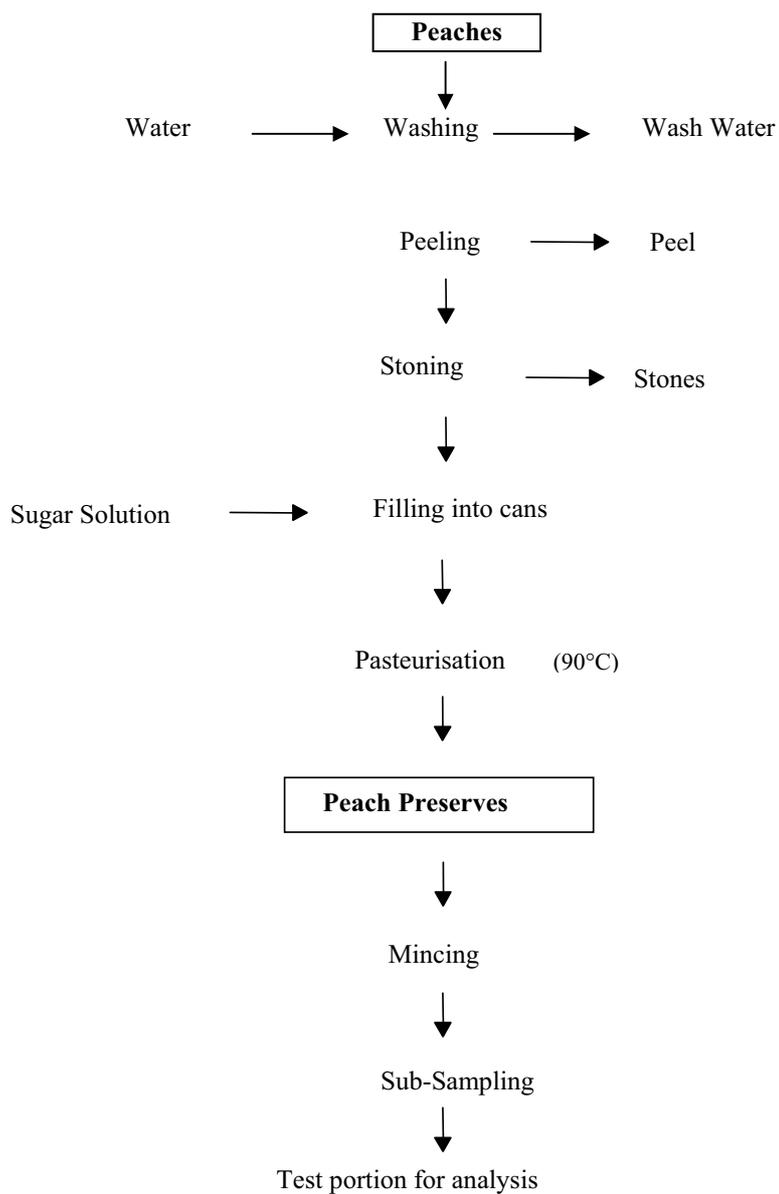


Figure 9. Flow Diagram for the preparation of washed peaches



samples or fractions to be analysed

Figure 10. Flow Diagram for the preparation of peach preserve

Table 71. Results from processing studies on peach.

Country Year (Variety)	Application					Commodity	Thiacloprid mg/kg	Processing factor	Author Date Report No.
	From	No.	kg ai/ha	kg ai/hL	PHI days				
Italy Ravenna  1995 (Red Haven)	480 SC	2	0.14	0.096	14	Fruit w/o stone (RAC)  Fruit, washed Preserve	0.03  0.02, 0.02 (0.02) < 0.02, < 0.02 (< 0.02)	  0.66 0.66	Placke, F. J. 1997v RA-3064/95

Country Year (Variety)	Application					Commodity	Thiacloprid mg/kg	Processing factor	Author Date Report No.
	From	No.	kg ai/ha	kg ai/hL	PHI days				
Italy Ravenna  1996 (Red Haven)	480 SC	2	0.14	0.096	14	Fruit with stone (RAC)  Fruit, washed  Preserve	0.03  < 0.02, < 0.02 (< 0.02)  < 0.02, < 0.02 (< 0.02)	  0.66  0.66	Placke, F. J. 1997w RA-3121/96
Spain La Fortesa  1996 (Baby Gold 9)	480 SC	2	0.14	0.096	14	Fruit with stone (RAC)  Fruit, washed Preserve	0.09  0.06, 0.06 (0.06) < 0.02, < 0.02 (< 0.02)	  0.66 0.22	Placke, F. J. 1997w RA-3121/96

RAC: raw agricultural commodity

### Cherries

For cherries one trial was conducted in Germany in 1999 (Schoening, R. and Sur, R., 2000c). Thiacloprid 480 SC was sprayed twice to sour cherry trees at a rate of 0.25 L/ha, corresponding to 0.12 kg ai/ha. The spray volume was 500 L per metre of plant height per hectare. The volume was adapted to the height of the leafy surface (500 L/(ha × m height) not exceeding 1500 L water/ha). The last treatment was performed 14 days prior to harvest. Samples were taken 14 days after the last application. The washing of cherries was done according to household practice. The preparation of cherry preserves simulated the industrial practice at laboratory scale. The processing procedures are described in Figure 11 and Figure 12. Analysis of thiacloprid was done according to method 00548.

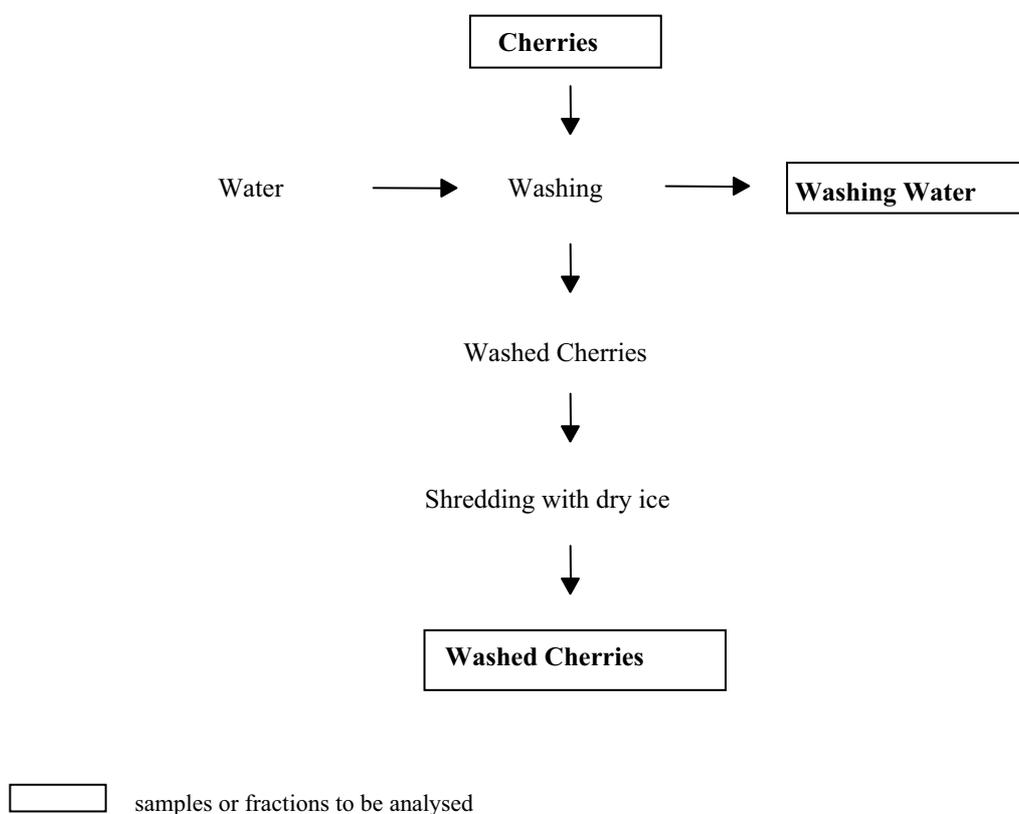


Figure 6. Flow diagram for the preparation of washed cherries.

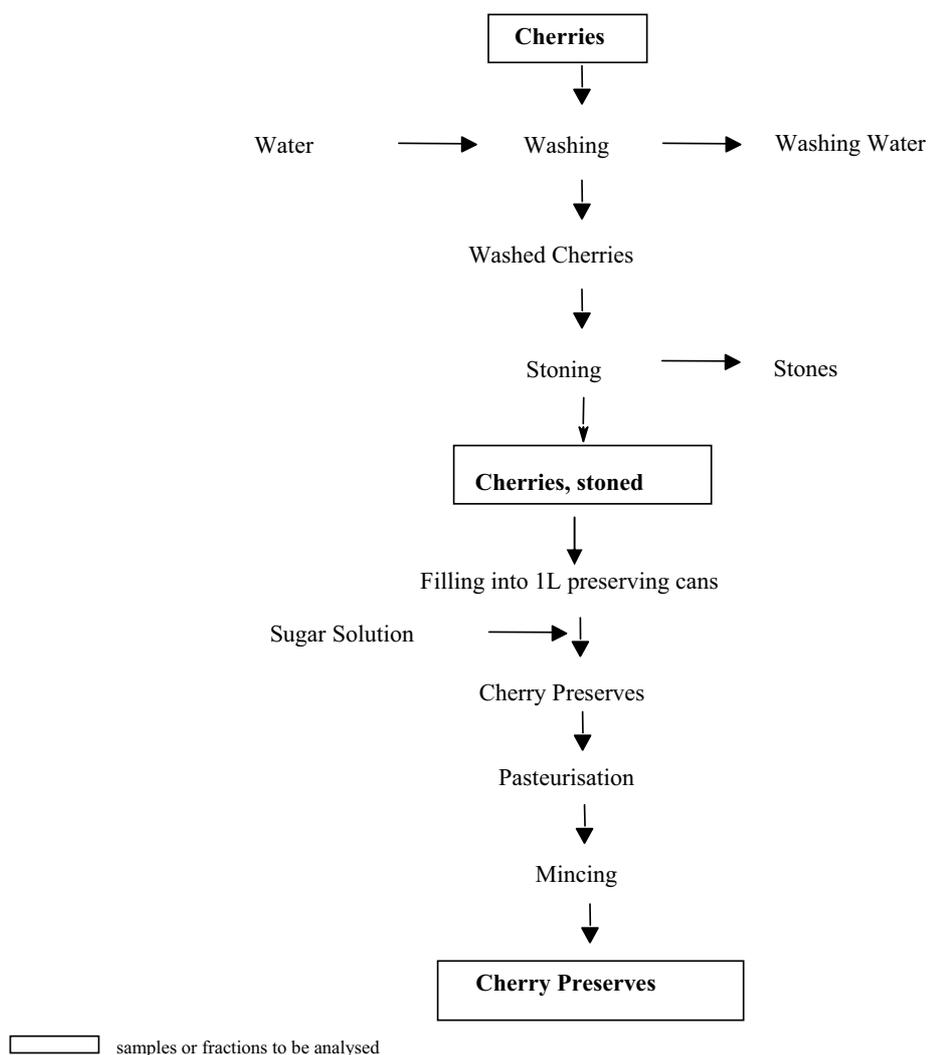


Figure 7. Flow diagram for the preparation of cherry preserve.

Residues of thiacloprid in the raw agricultural commodity (cherry fruit) and processed products harvested at a PHI of 14 days were below the limit of quantitation of 0.02 mg/kg. Therefore transfer factors could not be calculated.

### Tomatoes

Two greenhouse trials on tomatoes were performed in Spain and Germany in 1996. The application rate was 0.216 kg ai/ha. The water rate was 1500 L/ha corresponding to a spray concentration of 0.025% and 0.030%, respectively. The treatments were conducted during fruit development and fruit colouring at an interval of 14 days between the first and the second application and an interval of 7 days between the second and third application. The last application was carried out 3 days prior to the expected harvest (recommended harvest interval). For processing, tomato fruits were taken on day 3 from the treated and the untreated plots.

Treated tomatoes were washed and processed into juice, paste and preserves. The washing and peeling was done using domestic practice (see Figure 13); whereas the production of juice, paste and preserve simulated commercial processing at a laboratory scale (see Figures 14 and 15).

For the preparation of juice the tomatoes were washed in standing water and then cut into small pieces. The tomato pieces were heated, with the addition of 100 mL water per 1 kg of tomatoes, to 100°C for about 8–10 minutes to prevent enzymatic reactions. After this blanching process the tomato pulp was passed through a strainer to separate juice and pomace. Sodium chloride (0.5–0.7% relative to the amount of juice) was added to the raw juice. The tomato juice was then filled into preserving cans and pasteurised for 2 minutes at about 90°C.

For the preparation of tomato paste the tomatoes were washed in standing water and then cut into small pieces. The tomato pieces were heated, with the addition of 100 mL water per 1 kg tomatoes, to approximately 100°C for about 8–10 minutes in order to prevent enzymatic reactions. After this blanching process the tomato pulp was passed through a strainer to separate juice and pomace. Subsequently the tomato juice was concentrated to 38–45% dry weight. After concentration the tomato paste was filled into cans. The tomato paste was then pasteurised for 5 minutes at about 90°C.

For the preparation of preserves the tomatoes were transferred into lukewarm water. After a few minutes the peel was removed. The peeled tomatoes were filled into 1L preserving cans with tomato juice added. The preserves were then pasteurised for 2–3 minutes at about 90 °C.

The residues of thiacloprid were determined according to method 00419. The recoveries ranged from 86 to 107% for fruit, from 89 to 108% for juice, from 93 to 97% for paste and from 80 to 98% for preserve at fortification levels of 0.02 and 0.20 mg/kg. The limit of quantification (LOQ) was 0.02 mg/kg.

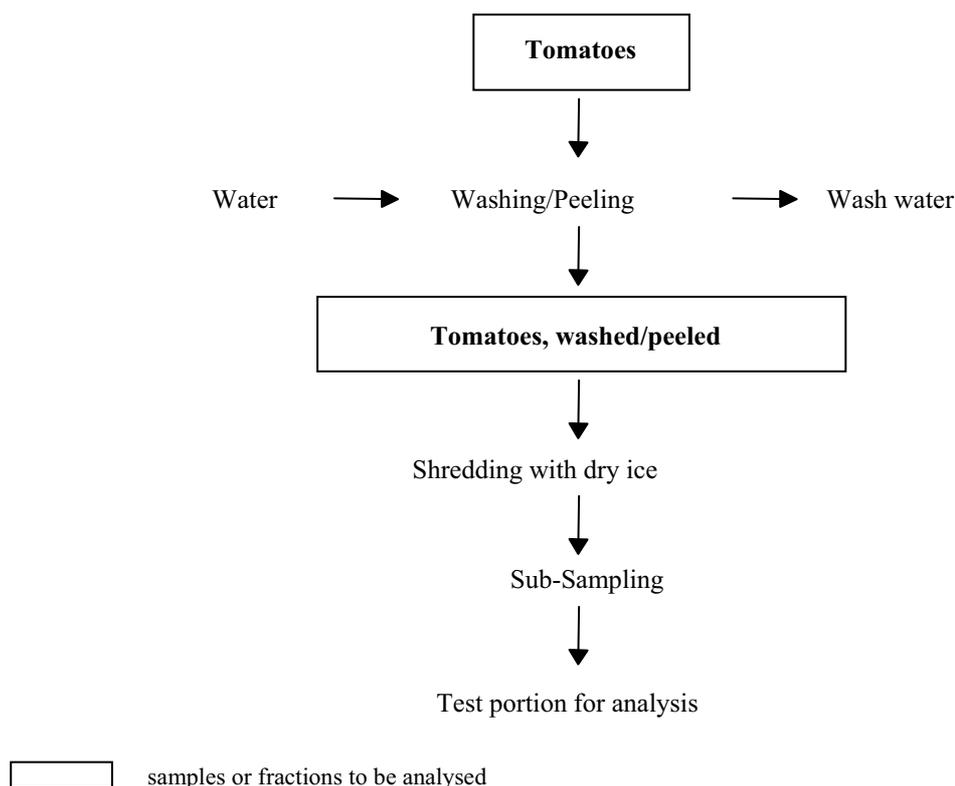


Figure 13. Flow diagram for the preparation of peeled tomatoes.

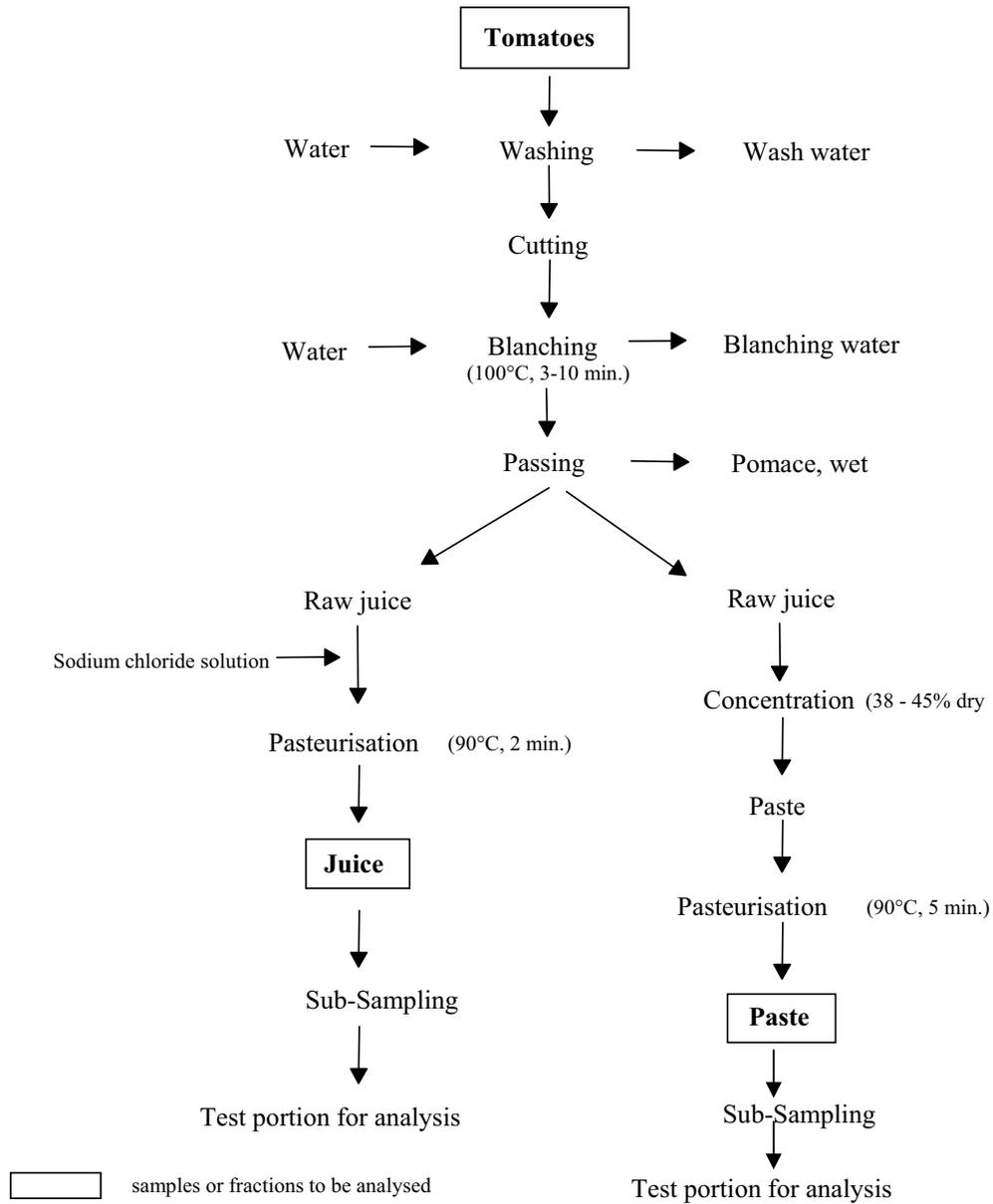


Figure 14. Flow diagram for the preparation of tomato juice and paste

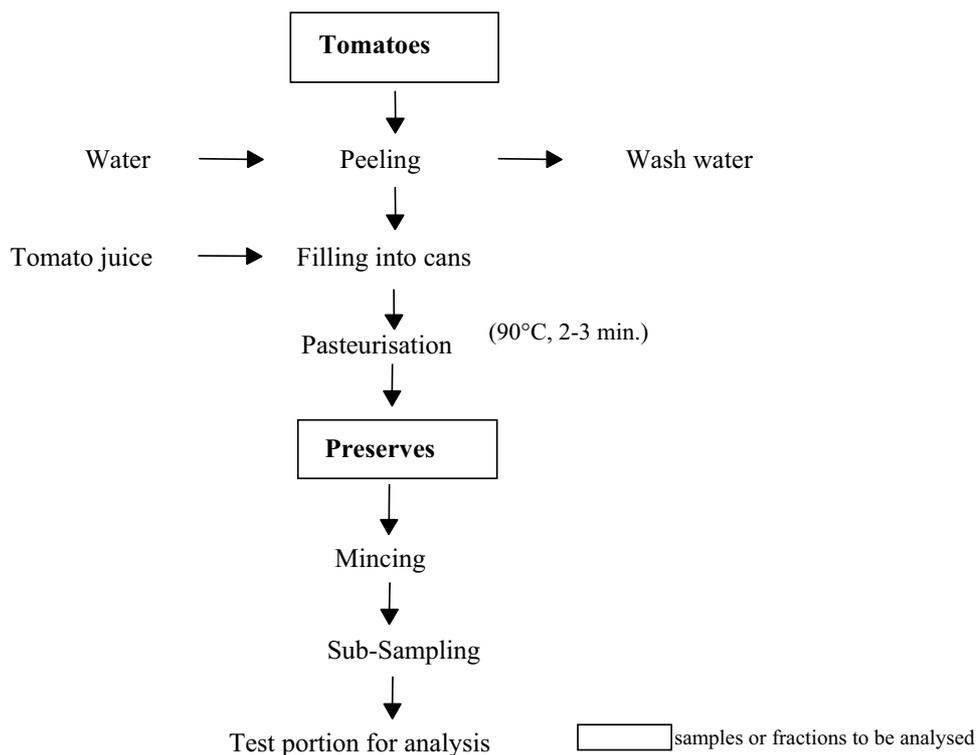


Figure 15. Flow diagram for the preparation of tomato preserves.

Table 72. Results from processing studies on tomato.

Country Year (Variety)	Application					Commodity	Thiacloprid mg/kg	Processing factor	Author Date Report No.
	From	No.	kg ai/ha	kg ai/hL	PHI days				
Spain Ruescas  1996 (Brillante)	480 SC	3	0.22	0.014	3	Fruit (RAC)	0.24		Placke, F. J. 1997x RA-3123/96
						Fruit, washed	0.13, 0.12 (0.125)	0.54	
						Fruit, peeled	0.06, 0.05 (0.06)	0.25	
						Paste	0.48	2	
						Juice	0.09, 0.10 (0.10)	0.42	
						Preserve	0.08, 0.07 (0.08)	0.33	
Germany Leichlingen  1996 (Ferrari)	480 SC	3	0.18	0.012	3	Fruit (RAC)	0.07		Placke, F. J. 1997x RA-3123/96
						Fruit, washed	0.06, 0.06 (0.06)	0.86	
						Fruit, peeled	0.03, 0.03 (0.03)	0.43	
						Paste	0.22, 0.22 (0.22)	3.1	
						Juice	0.05, 0.05 (0.05)	0.71	
						Preserve	0.05, 0.05 (0.05)	0.71	

RAC: raw agricultural commodity

## RESIDUES IN ANIMAL COMMODITIES

### *Farm animal feeding studies*

A ruminant feeding study was reported. No study was available on poultry feeding.

A feeding study on cow was carried out at three dosing levels equivalent to 2.1 (0.07 mg/kg bw) (1×), 6.2 (0.213 mg/kg bw) (3×) and 20.6 ppm (0.655 mg/kg bw) (10×) thiacloprid in the diet

together with an untreated control group (Placke, F. J., 1998b). There were three cows in each of the treatment groups. After acclimatisation, thiacloprid was administered daily to the cows in gelatine capsules for 28 consecutive days. Milk samples were collected and composited for each cow. At the end of the 28-day dosing period, the cows were sacrificed, and kidney, liver, composite fat (omental and perirenal), and composite muscle (flank, leg, and loin) were removed from each cow. Blood was washed from the tissues. The tissues were immediately cut into small pieces, frozen with dry ice, and stored in a freezer below -18°C until processing. Tissues from each cow were kept separate for individual analysis. All milk samples were kept in a freezer below -18°C until analysis and were also individually processed and analysed.

Samples of tissues and milk were analysed for parent and total residues of thiacloprid. The total residues comprising the active substance and all metabolites containing the 6-chloropyridine moiety were determined according to method 00491 (Schoening, R., 1998b), while the active substance residues were determined according to method 00490 (Schoening, R., 1998a).

The results are shown in Table 73 to Table 76. On average of the three cows treated per dose group, liver contained the highest thiacloprid residue levels (0.10 mg/kg) followed by kidney (0.03 mg/kg), milk and muscle (0.02 mg/kg) and fat (0.01 mg/kg) at the 1× dose level. Maximum levels for tissues were 0.02 mg/kg for fat, 0.02 mg/kg for muscle, 0.04 mg/kg for kidney and 0.11 mg/kg for liver.

In the second dose group thiacloprid residue increased to average values of 0.04 mg/kg in milk and fat (highest value 0.04 mg/kg) 0.05 mg/kg in muscle (highest value 0.06 mg/kg), 0.1 mg/kg in kidney (highest value 0.11 mg/kg) and 0.29 mg/kg in liver (highest value 0.32 mg/kg). In the high dose group the findings were 0.17 mg/kg in milk, 0.12 mg/kg in fat (highest value 0.16 mg/kg), 0.16 mg/kg in muscle (highest value 0.18 mg/kg), 0.27 mg/kg in kidney (highest value 0.32 mg/kg) and 0.94 mg/kg in liver (highest value 1.1 mg/kg).

A linear relation between the dose levels and the residue concentrations was observed. In the milk, residues reached a plateau level within five days and no accumulation was observed.

Table 73. Residues in milk 1× dose group (2.1 ppm, 0.07 mg/kg bw).

Days	Cow 4		Cow 5		Cow 6		Average	
	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg
1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2	0.01	0.01	0.011	0.014	0.016	< 0.01	0.013	0.011
5	0.014	0.02	0.014	0.02	0.021	0.026	0.016	0.022
8	0.014	0.017	0.014	0.017	0.02	0.025	0.016	0.020
11	0.018	0.02	0.020	0.014	0.03	0.025	0.023	0.020
14	0.013	0.017	0.017	0.022	0.022	0.026	0.017	0.022
17	0.017	0.02	0.015	0.02	0.025	0.027	0.019	0.022
20	0.021	0.025	0.013	0.019	0.021	0.022	0.018	0.022
25	0.011	0.016	0.012	0.017	0.016	0.018	0.013	0.017
28	0.012	< 0.01	< 0.01	0.014	0.016	0.015	0.013	0.013

<sup>1</sup> determined as 6-CAN

Table 74. Residues in milk 3× dose group (6.2 ppm, 0.213 mg/kg bw).

Days	Cow 6		Cow 8		Cow 9		Average	
	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg
1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2	0.031	0.05	0.035	0.052	0.04	0.055	0.035	0.052
5	0.035	0.061	0.034	0.064	0.057	0.084	0.042	0.070
8	0.039	0.066	0.046	0.064	0.054	0.08	0.046	0.070
11	0.039	0.055	0.038	0.043	0.050	0.066	0.042	0.055
14	0.032	0.043	0.04	0.047	0.053	0.059	0.042	0.050

Days	Cow 6		Cow 8		Cow 9		Average	
	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg
20	0.043	0.059	0.059	0.068	0.059	0.061	0.054	0.063
28	0.033	0.046	0.042	0.051	0.043	0.057	0.039	0.051

<sup>1</sup> determined as 6-CNA

Table 75. Residues in milk 10× dose group (20.6 ppm, 0.655 mg/kg bw).

Days	Cow 10		Cow 11		Cow 12		Average	
	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg
1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2	0.119	0.147	0.097	0.119	0.080	0.104	0.099	0.123
5	0.147	0.185	0.142	0.192	0.123	0.155	0.137	0.177
8	0.143	0.192	0.142	0.182	0.126	0.162	0.137	0.179
11	0.122	0.148	0.139	0.189	0.124	0.152	0.128	0.163
14	0.121	0.153	0.152	0.208	0.146	0.184	0.140	0.182
17	0.122	0.201	0.154	0.212	0.150	0.234	0.142	0.216
20	0.127	0.180	0.171	0.230	0.107	0.122	0.135	0.177
25	0.1	0.144	0.094	0.151	0.120	0.170	0.105	0.155
28	0.096	0.136	0.098	0.170	0.063	0.094	0.086	0.133

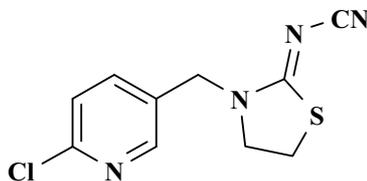
<sup>1</sup> determined as 6-CNA

Table 76. Residue concentrations in the edible tissues.

Animal	Liver		Kidney		Muscle		Fat	
	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg	Thiacloprid mg/kg	Total residue <sup>1</sup> mg/kg
Control, Cow 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Control, Cow 3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1×, Cow 4	0.09, 0.09 (0.09)	0.09, 0.09 (0.09)	0.03, 0.03 (0.03)	0.05, 0.04 (0.05)	0.02, 0.02 (0.02)	0.02, 0.02 (0.02)	0.01, 0.01 (0.01)	0.02, 0.02 (0.02)
1×, Cow 5	0.09, 0.09 (0.09)	0.08, 0.08 (0.08)	0.03, 0.03 (0.03)	0.05, 0.04 (0.05)	0.02, 0.01 (0.02)	0.02, 0.02 (0.02)	0.01, 0.01 (0.01)	0.01, 0.01 (0.01)
1×, Cow 6	0.11, 0.11 (0.11)	0.12, 0.11 (0.12)	0.04, 0.04 (0.04)	0.06, 0.06 (0.06)	0.02, 0.02 (0.02)	0.02, 0.02 (0.02)	0.02, 0.02 (0.02)	0.02, 0.02 (0.02)
1×, mean	0.10	0.10	0.03	0.05	0.02	0.02	0.01	0.02
3×, Cow 7	0.28, 0.26 (0.27)	0.28, 0.27 (0.28)	0.09, 0.09 (0.09)	0.15, 0.14 (0.15)	0.05, 0.05 (0.05)	0.05, 0.05 (0.05)	0.03, 0.03 (0.03)	0.03, 0.03 (0.03)
3×, Cow 8	0.31, 0.32 (0.32)	0.27, 0.29 (0.28)	0.09, 0.09 (0.09)	0.17, 0.20 (0.19)	0.05, 0.05 (0.05)	0.05, 0.05 (0.05)	0.04, 0.04 (0.04)	0.04, 0.04 (0.04)
3×, Cow 9	0.29, 0.27 (0.28)	0.28, 0.30 (0.29)	0.11, 0.11 (0.11)	0.16, 0.18 (0.17)	0.06, 0.06 (0.06)	0.06, 0.06 (0.06)	0.04, 0.04 (0.04)	0.04, 0.04 (0.04)
3×, mean	0.29	0.28	0.10	0.17	0.05	0.05	0.04	0.04
10×, Cow 10	0.91, 0.91 (0.91)	0.87, 0.85 (0.86)	0.23, 0.24 (0.24)	0.51, 0.45 (0.48)	0.15, 0.14 (0.15)	0.15, 0.15 (0.15)	0.12, 0.12 (0.12)	0.14, 0.15 (0.15)
10×, Cow 11	1.1, 1.1 (1.1)	1.1, 1.2 (1.2)	0.32, 0.31 (0.32)	0.61, 0.60 (0.61)	0.18, 0.18 (0.18)	0.19, 0.18 (0.19)	0.12, 0.13 (0.13)	0.16, 0.15 (0.16)
10×, Cow 12	0.81, 0.79 (0.80)	0.81, 0.84 (0.83)	0.26, 0.24 (0.25)	0.48, 0.48 (0.48)	0.15, 0.15 (0.15)	0.15, 0.14 (0.15)	0.10, 0.09 (0.10)	0.12, 0.13 (0.13)
10×, mean	0.94	0.96	0.27	0.52	0.16	0.17	0.12	0.15

**APPRAISAL**

N-{3-[(6-Chloro-3-pyridinyl)methyl]-1,3-thiazolan-2-yliden}cyanamide



Residues and analytical aspects of thiacloprid were considered for the first time by the present Meeting.

Thiacloprid is a non-systemic insecticide with registered uses in many countries. Thiacloprid causes disruption of the insect nervous system by acting as an inhibitor at nicotinic acetylcholine receptors.

The following abbreviations are used for the metabolites discussed below:

thiacloprid-amide	{3-[(6-chloro-3-pyridinyl)methyl]-2-thiazolidinylidene} urea (M02)
6-CNA	6-chloro-3-pyridinecarboxylic acid (M03)
thiacloprid-sulfoxide	N-[(6-chloro-3-pyridinyl)methyl]-N'-cyano-N-[2-(methylsulfinyl)-ethyl]urea (M08)
M09	N-{[6-(methylthio)-3-pyridinyl]-carbonyl} glycine
M12	Glucuronic acid conjugate of {3-[(6-chloro-3-pyridinyl)methyl]-4(or 5)-hydroxy-2-thiazolidinylidene} =
thiacloprid sulfonic acid	Sodium 2-[[[(aminocarbonyl)amino]-carbonyl][(6-chloro-3-pyridinyl)-methyl]amino]ethanesulfonate (M30)

***Animal metabolism***

The Meeting received results of animal metabolism studies in lactating goats and laying hens.

***Goats***

One lactating goat was dosed with [methylene-<sup>14</sup>C]-thiacloprid at a rate of 10 mg/kg body weight for three consecutive days. Approximately 53.7% of the total radioactivity administered was excreted until sacrifice. A portion of about 48.3% was eliminated with urine and 4.5% with faeces. Due to the short period between the last dose and sacrifice, 40% of the dose was not recovered in the excreta. A low amount (0.93%) was secreted with the milk. At sacrifice 6 hours after the last dose, the total radioactive residues (TRR) in the edible tissues and organs accounted for 5.6% of the administered radioactivity. The major portion and the highest equivalent concentration were observed in the kidney and the liver.

The metabolism of thiacloprid in goats is comparable to the metabolism in rats.

The unchanged parent compound was found in all goat tissues and ranged from 28% of the TRR (equiv. to 7 mg/kg) in kidney, 61% (equiv. to 1.5 mg/kg) in milk, 83% (equiv. to 14.5 mg/kg) in liver, 90% (equiv. to 1.6 mg/kg) in fat to 92% (equiv. to 3.5 mg/kg) in muscle.

Further main metabolites were identified in kidney. Thiacloprid-sulfoxide was found at levels of 12.3% of the TRR (equiv. to 3.1 mg/kg) and M12 at 10% of the TRR (equiv. to 2.5 mg/kg). Except for thiacloprid-sulfoxide in milk (8.7% of the TRR) no other relevant metabolites in concentrations above 8% of the TRR were identified.

### *Hens*

A group of six laying hens were fed with [methylene-<sup>14</sup>C]-thiacloprid for three consecutive days at a dose rate of 10 mg/kg body weight each. Until sacrifice the excretion amounted on average to 75.4% of the total radioactivity administered. About 29.4% and 29.6% of the radioactivity eliminated during the test period was excreted within 24 hours of the first and the second doses, respectively. Another 16.4% was excreted between the final dose and sacrifice. On average, only 0.06% (equivalent to 0.4 mg/kg) of the total dose was determined in the eggs. Residue levels in liver, kidney, muscle (leg), muscle (breast) and skin (without fat) were 3.1, 2.4, 0.15, 0.13 and 0.30 mg/kg TRR, respectively.

The metabolism of thiacloprid in laying hens is comparable to the metabolism in rats.

The unchanged parent compound was found in all hen tissues and ranged from 17% of the TRR (equiv. to 0.54 mg/kg) in liver, 19% (equiv. to 0.03 mg/kg) in muscle, 48% (equiv. to 0.06 mg/kg) in eggs to 72% (equiv. to 0.08 mg/kg) in fat.

Further main metabolites were identified in muscle only. M9 was found at levels of 10.9% of the TRR (equiv. to 0.016 mg/kg). Except for thiacloprid-sulfoxide in fat (8.9% of the TRR) no other relevant metabolites in concentrations above 8% of the TRR were identified.

Thiacloprid is only moderately metabolized by goats and hens with 5.6% (goats) and 0.7% (hens) of the applied dose remaining in tissues after three days. The proposed metabolic pathway was via hydroxylation and the formation of glucuronide and cysteine conjugates, resulting in a large variety of metabolites in small amounts.

### ***Plant metabolism***

The Meeting received plant metabolism studies for thiacloprid on apples, tomatoes, cotton and wheat. In all studies [methylene-<sup>14</sup>C]-thiacloprid was applied as a spray.

All plant metabolism studies demonstrated that the metabolic pathway of thiacloprid is comparable in all crops investigated. The main metabolic reactions are:

the hydroxylation of the parent compound at the thiazolidine ring

the oxidative cleavage at the methylene bridge leading to the partially and fully oxidised products 6-chloropicolyl alcohol (M36), 6-chloronicotinic acid (M03)

conjugation of these two aglycones with sugars, phosphate/sulfate and endogenous plant components.

Uptake of soil metabolites followed by further metabolisation also took place. However, these metabolic reactions occurred only to a limited extent, the majority of residue remained on the surface of the fruits as unchanged parent compound exceeding 90% of the total residue. The major metabolites identified were the monohydroxylated derivative of thiacloprid (M01; apples) and the oxidation product 6-chloronicotinic acid (M03; cotton seed, wheat) as well as various conjugates thereof or of its precursor 6-chloropicolyl alcohol (M36; cotton, tomatoes, wheat).

In translocation experiments with tomatoes it was shown that less than 0.1% of the radioactivity in the soil was transported into the fruits after uptake via the roots.

In cotton seeds a different metabolic pattern with 6-chloronicotinic acid (M03), being the main residue (46%), was observed, which might be the result of partitioning and selective transport effects. In treated cotton leaves the metabolism followed the same steps found in the other plants investigated:

hydroxylation of the parent compound at the thiazolidine ring;

cleavage at the methylene bridge leading to the partially and fully oxidised products 6-chloropicolyl alcohol (M36) and 6-chloronicotinic acid (M03);

conjugation of these two aglycones with sugars, phosphate/sulfate and endogenous plant components.

In each crop tested except cotton seeds, unchanged thiacloprid was found to be relevant residue with amount > 80% of the TRR.

### *Environmental fate*

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

The soil photolysis study conducted with [methylene-<sup>14</sup>C]-thiacloprid gave evidence that no accelerated degradation occurs under irradiation. Thiacloprid-amide could be identified as the main degradation byproduct. The calculated environmental half-life for thiacloprid was 74 days during midday and midsummer at 40° of latitude. No additional metabolites were identified in the samples.

In confined rotational crops studies, soil was treated with [pyridinyl-<sup>14</sup>C-methyl]-thiacloprid. Turnips, lettuce and wheat were sown into the treated soil at intervals of 30, 170 and 354 days after treatment and were grown to maturity and harvested for analysis. In all matrices radioactivity above 0.01 mg/kg was found. After 354 days the residues measured ranged from 0.005 mg/kg in turnip bulbs up to 0.322 mg/kg in wheat straw. Thiacloprid-amide and thiacloprid sulfonic acid could be identified as relevant metabolites accounting for 15 – 35% of the TRR each. No parent thiacloprid was found.

The Meeting concluded that thiacloprid residues from the use of thiacloprid do not occur in concentrations above 0.01 mg/kg.

### *Methods of Analysis*

The Meeting received descriptions and validation data for analytical methods for thiacloprid in plant and animal matrices. The method for enforcement purposes is based on extraction with acetone/water (3:1; v:v) and a subsequent clean-up by column chromatography on Florisil and elution with acetonitrile. The residues of thiacloprid parent compound are quantified by reversed phase HPLC with UV detection at 242 nm. Validation data for apples, tomatoes, cucumbers, peaches, citrus fruits, cotton seed, potatoes and tobacco was presented. In general a LOQ of 0.02 – 0.05 mg/kg was achieved, the recoveries were in the range of 72% to 105%.

Animal matrices were extracted with a mixture of acetonitrile/water or methanol. For milk samples, partitioning of the extracts against n-hexane was performed to remove fat. The aqueous remainder is partitioned against cyclohexane/ethyl acetate using a ChemElut column. Further clean-up is performed by column chromatography on Florisil and elution with acetonitrile. The residues are quantified by reversed phase HPLC with UV-detection at 242 nm. The method was validated by conducting recovery tests with muscle, milk and eggs. An LOQ of 0.01 mg/kg in milk and 0.02 mg/kg in muscle and egg was achieved, the recoveries were in the range of 75% to 104%.

In addition the meeting received information on various specialized methods, mainly based on HPLC-MS/MS techniques with modification in the extraction and clean-up procedure. These methods for plant and animal matrices detect thiacloprid and possible metabolites with LOQs ranging from 0.01 mg/kg to 0.5 mg/kg (rice), depending on the matrix. In general an LOQ of 0.02 mg/kg could be achieved for all matrices except rice.

For thiacloprid, additional methods for the determination of all moieties containing 6-CNA were available. Thiacloprid and its metabolites were extracted from plant matrices with an acidic methanol / water mixture. After the clean-up thiacloprid and all metabolites containing the 6-chloropicolyl moiety were oxidized with alkaline potassium permanganate solution to yield 6-chloronicotinic acid. This was followed by acidification and reduction of the excess permanganate and the developed manganese dioxide with sodium bisulfite. The 6-CNA was converted to the corresponding trimethylsilyl ester with MSTFA (N-methyl-trimethylsilyltrifluoroacetamide) prior to quantitation by gas chromatography with mass selective detection in the single-ion monitoring mode.

(GC-MS). Validation data for pome fruits, tomatoes, cotton seed, rape seed, sunflower seed, milk, muscle, liver, kidney and fat was presented. In general a LOQ of 0.05 mg/kg for plant matrices and 0.01 – 0.02 mg/kg for animal matrices was achieved, the recoveries were in the range of 66% to 102%.

### ***Stability of pesticide residues in stored analytical samples***

The Meeting received information on the stability of thiacloprid in apples, currants, tomatoes, melons, peas, potatoes, cotton seed, rape seed, wheat and tobacco. All samples were fortified at 0.2 mg/kg (except tobacco with 2 mg/kg) and stored at -20°C for between 540 and 730 days. In all matrices the remaining thiacloprid residues levels were above 80% of the initial fortification concentrations.

No stability study was submitted to the Meeting on animal matrices.

### ***Residue definition***

The results of the radiolabeled thiacloprid plant metabolism studies on apples, tomatoes, cotton and wheat indicate that thiacloprid metabolizes or degrades slowly under typical foliar application conditions. Greater than 80% of the TRR is recovered as thiacloprid and no significant metabolites or degradates were found in crops treated directly.

In rotational crop studies significant total radioactive residues were found in lettuce and wheat. Most of the residue consisted of the metabolites thiacloprid amide (M02) and thiacloprid sulfonic acid (M30). Unchanged thiacloprid was not identified. These metabolites are not considered toxicologically significant and need not be considered for the residue definition.

In ruminants, orally administered radiolabeled thiacloprid undergoes limited metabolism to glucuronide and cysteine conjugates after hydroxylation. The major component in all matrices was unchanged thiacloprid (> 80% TRR in liver, fat and muscle, 61% TRR in milk and 28% TRR in kidney). Further metabolites were identified in kidney at levels below 12% of the TRR. In poultry orally administered (dosed at 10 mg/kg body weight) thiacloprid was moderately metabolised. In all matrices thiacloprid was identified as the major component (17% TRR liver, 19% TRR muscle, 48% TRR in eggs, 72% TRR in fat). Further metabolite found in muscle, was only M9 which accounted for 10.9% of the TRR.

The log  $P_{ow}$  of thiacloprid is 1.26. As no accumulation in fat was observed in animal metabolism studies the Meeting concluded that thiacloprid is not fat-soluble.

The analytical methods determine thiacloprid, possible metabolites or the total residue determined as 6-CNA.

Based on the results of the metabolism studies the Meeting concluded that the residue definition for enforcement and dietary intake calculations in plant and animal commodities is thiacloprid. The residue is not fat-soluble.

### ***Results of supervised trials on crops***

#### ***Citrus fruit***

The Meeting received information on supervised residue trials on lemons and oranges from Brazil, New Zealand and South Africa.

In Brazil thiacloprid can be applied to citrus at 0.0048 kg ai/hL with a PHI of 21 days. In two Brazilian trials on lemons three applications were made at a rate of 0.0048 kg ai/hL and 0.0096 kg ai/hL with a PHI of 21 days. No whole fruit residue data was submitted.

One trial on lemons was submitted from New Zealand where a single spray application of 0.0096 kg ai/hL was made. Residues on whole lemon fruit were found to decline from 0.19 mg/kg 1 day after treatment to 0.07 mg/kg by day 14. A GAP for New Zealand was not submitted.

In South Africa thiacloprid can be applied to citrus at a rate of 0.0067 kg ai/hL. Corresponding number of applications or PHI was not stated. In two residue trials on oranges one treatment was conducted with spray concentrations of 0.014 kg ai/hL to 0.029 kg ai/hL with the PHI ranging from 44 to 190 days. No residues above the LOQ of 0.02 mg/kg were found in all samples.

The Meeting concluded that there was insufficient data available to support a recommendation for citrus fruit.

### *Pome fruit*

The Meeting received information on supervised residue trials on apples from Australia, Belgium, France, Germany, Italy, Japan, the Netherlands, South Africa, Spain, United Kingdom and the USA.

Thiacloprid is registered for use on apples or pome fruits in some European countries as a pre-harvest foliar spray treatment. Residue trials were carried out in Belgium, France, Germany, Italy, the Netherlands, Spain and the United Kingdom. The GAPs from Austria, Belgium, Cyprus, Czech Republic, Greece, Hungary, Italy, the Netherlands, Russia and the United Kingdom consisted of two to three spray applications at 0.012 – 0.014 kg ai/hL with a PHI of 14 days. The residues matching this GAP in the whole fruits were: 0.04, 0.05, 0.1 (2), 0.11, 0.13, 0.14, 0.16, 0.21 and 0.36 mg/kg.

In Croatia, Germany, Latvia, Lithuania, Portugal, Romania, Slovakia, Slovenia and Spain the GAP consists of two to three spray application at a rate of 0.0096 kg ai/hL with a PHI of 14 days. The residues matching this GAP in the whole fruits were: 0.02, 0.04, 0.07, 0.08, 0.1, 0.11 and 0.12 mg/kg.

GAP in USA for apples consists of up to six applications at 0.01 kg ai/hL and a PHI of 30 days. The residues from 14 supervised trials in the USA, matching the US GAP ( $\pm 30\%$ ), were: 0.02, 0.04, 0.05, 0.06 (3), 0.07 (2), 0.09 (2), 0.1, 0.11, 0.14 and 0.28 mg/kg.

GAP in South Africa for apples consists of up to four applications at 0.0072 kg ai/hL and a PHI of 14 days. Of the four supervised trials provided from South Africa none matching South African GAP.

GAP in Japan for apples consists of up to three applications at 0.015 kg ai/hL and a PHI of seven days. The residues from two supervised trials in Japan matching GAP were 0.11 and 0.30 mg/kg.

GAP in Australia for apples consists of up to three applications at 0.018 kg ai/hL and a PHI of 14 days. The residue from one trial in Australia, matching GAP ( $\pm 30\%$ ), was 0.37 mg/kg.

The Meeting decided to pool the data from Australia, Europe, Japan and the USA. The combined results (n = 34) for apples were: 0.02 (2), 0.04 (3), 0.05 (2), 0.06 (3), 0.07 (3), 0.08, 0.09 (2), 0.1 (4), 0.11 (4), 0.12, 0.13, 0.14, 0.14, 0.16, 0.21, 0.28, 0.30, 0.36 and 0.37 mg/kg.

Field trials involving thiacloprid on pears were provided from Australia, South Africa and USA.

GAP in USA for pears consists of up to six applications at 0.01 kg ai/hL and a PHI of 30 days. The residues from 14 supervised trials in the USA, matching GAP ( $\pm 30\%$ ), in ranked order were :0.05, 0.06, 0.1, 0.14, 0.14, 0.23, 0.24 and 0.27 mg/kg.

GAP in South Africa for pears consists of up to four applications at 0.0072 kg ai/hL and a PHI of 14 days. Of the four supervised trials provided from South Africa none matched GAP.

GAP in Japan for pears consists of up to three applications at 0.015 kg ai/hL and a PHI of seven days. The residues from two supervised trials in Japan matching GAP were: 0.61 and 0.87 mg/kg.

GAP in Australia for pears is up to three applications with 0.018 kg ai/hL each and a PHI of 14 days. The residues from two supervised trials in Australia, matching the GAP, were 0.37 and 0.38 mg/kg.

The Mann-Whitney-U test indicated that the medians of the residues from the Japanese and the combined Australian and US data set for pears were not similar. The Meeting decided to pool only the data from Australia and the USA. The combined results (n = 10) for pears were 0.05, 0.06, 0.1, 0.14, 0.14, 0.23, 0.24, 0.27, 0.37 and 0.38 mg/kg.

The Meeting decided to make a recommendation for the crop group of pome fruits based on the combined data for apples and pears.

For apples and pears the combined results were 0.02, 0.02, 0.04(3), 0.05(3), 0.06(4), 0.07(3), 0.08, 0.09, 0.09, 0.1(5), 0.11(4), 0.12, 0.13, 0.14(4), 0.16, 0.21, 0.23, 0.24, 0.27, 0.28, 0.30, 0.36, 0.37, 0.37 and 0.38 mg/kg.

Based on residue data for apples and pears the Meeting decided to recommend a maximum residue level of 0.7 mg/kg, a STMR of 0.11 mg/kg and a HR of 0.38 mg/kg for pome fruits.

### *Stone fruits*

The Meeting received information on supervised residue trials on Japanese apricots from Japan.

GAP in Japan for Japanese apricots consists of up to two applications at 0.0075 kg ai/hL with a PHI of seven days. The residue trials from Japan were conducted with an application rate of 0.015 kg ai/hL, which did not correspond to the submitted GAP.

Field trials on peaches were available from France, Italy, Japan and Spain.

GAP in Cyprus, Greece, Italy and Slovenia for peaches/nectarines consists of up to two applications at 0.0096 to 0.012 kg ai/hL and a PHI of 14 days. The residues in whole fruits from nine supervised trials in Europe matching the GAP were: 0.03(3), 0.06, 0.08, 0.09, 0.13, 0.13 and 0.19 mg/kg.

GAP in Japan for peaches is up to three applications at 0.015 kg ai/hL and a PHI of 7 days. The residues from two supervised trials from Japan matching the GAP  $\pm$  30% were 0.27 and 0.40 mg/kg.

The Mann-Whitney-U test for the data from Japan and the residue data from Europe suggested a similar median for both distributions. The combined residue data was 0.03(3), 0.06, 0.08, 0.09, 0.13, 0.13, 0.19, 0.27 and 0.40 mg/kg.

Field trials on cherries were provided from Belgium, France, Germany, Italy, Japan, Spain and USA.

GAP in Croatia, Cyprus, Czech Republic, the Netherlands, Romania, Slovenia and the United Kingdom for cherries is up to two applications with 0.0096 to 0.015 kg ai/hL each and a PHI of 14 days. The residues in whole fruits from 12 supervised trials in Europe matching the GAP were for sour cherries < 0.02, 0.02, 0.03, 0.04 mg/kg and for sweet cherries 0.02, 0.06, 0.06, 0.07, 0.08, 0.1, 0.11 and 0.15 mg/kg.

GAP in Japan for cherries is up to two applications with 0.015 kg ai/hL each and a PHI of one day. The residues from two supervised trials in Japan matching the GAP were 1.4 and 2.4 mg/kg. The Mann-Whitney-U test indicated that the medians of residues, resulting from applications according to the Japanese and European GAP for cherries, were not similar. Therefore only the data from the European trials were considered for further evaluation.

The Mann-Whitney-U test gave evidence that a similar distribution for sweet and sour cherries were not similar. Therefore only the data for sweet cherries were used for further evaluation.

In Northern America thiacloprid is not registered for use in cherries. Therefore the available supervised residue trials from USA were not considered.

Field trials on plums were provided from France, Germany, Spain and USA.

GAP in the Czech Republic, the Netherlands and Romania for plums is up to two applications at 0.0096 to 0.012 kg ai/hL and a PHI of 14 days. The residues in whole fruits from 14 supervised trials in Europe matching the GAP were: < 0.02(6), 0.02(5), 0.03, 0.03 and 0.05 mg/kg.

GAP in Japan for plums is up to three applications with 0.0075 kg ai/hL each and a PHI of seven days. The residue trials from Japan were conducted with an application rate of 0.015 kg ai/hL, which does not correspond to the submitted GAP.

In Northern America thiacloprid is not registered for use in plums. Therefore the available supervised residue trials from USA are not considered for evaluation.

The Meeting decided to make a recommendation for the stone fruits crop group, based on the combined data for peaches and sweet cherries.

For peaches and sweet cherries the combined results were 0.02, 0.03(3), 0.06(3), 0.07, 0.08, 0.08, 0.09, 0.1, 0.11, 0.13, 0.13, 0.15, 0.19, 0.27 and 0.40 mg/kg.

Based on residue data for peaches and sweet cherries the Meeting recommends a maximum residue level of 0.5 mg/kg, a STMR of 0.08 mg/kg and a HR of 0.4 mg/kg for thiacloprid in stone fruits.

### *Grapes*

Field trials on grapes were provided from Japan.

GAP in Japan for grapes consists of up to two applications at 0.53 kg ai/ha each and a PHI of 21 days. The residues from 4 supervised trials in Japan matching the GAP ( $\pm 30\%$ ) were: 0.12, 0.44, 0.80 and 1.6 mg/kg. The Meeting decided that four residue trials were not sufficient for a recommendation for grapes.

### *Berries and other small fruits except grapes*

Field and glasshouse trials on strawberries were provided from Belgium, France, Germany, Japan, the Netherlands, Italy, Spain and the United Kingdom.

The GAP for field use in the Netherlands and the United Kingdom for strawberries consists of up to two applications at 0.12 kg ai/ha each and a PHI of three days. The residues from eight supervised trials in Europe matching the GAP were: 0.02, 0.03, 0.04, 0.07, 0.07, 0.08, 0.08 and 0.09 mg/kg.

GAP for glasshouse use in the Netherlands and the United Kingdom for strawberries is up to two applications at 0.12 to 0.14 kg ai/ha each and a PHI of one day. The residues from eight supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were 0.04, 0.05, 0.13, 0.22, 0.31(3) and 0.33 mg/kg.

GAP in Japan for protected strawberries is up to three applications with 0.23 kg ai/ha each and a PHI of one day. The residue trials from Japan were conducted with an application rate of 0.15 kg ai/ha, which does not correspond to the submitted GAP.

Field trials on currants were provided from Belgium, Germany and the United Kingdom. GAP in Germany, Latvia, the Netherlands and the United Kingdom for currants is up to three applications with 0.072 to 0.14 kg ai/ha each and a PHI of three days. The residues from eight supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were: 0.08, 0.16, 0.21, 0.21, 0.28, 0.35, 0.37 and 0.59 mg/kg.

Field trials on raspberries were provided from Germany and the United Kingdom. GAP in Germany, the Netherlands and the United Kingdom for raspberries is up to three applications with 0.096 to 0.14 kg ai/ha each and a PHI of three days. The residues from eight supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were: 0.1, 0.15, 0.15, 0.27, 0.31, 0.34, 0.34 and 0.62 mg/kg.

Various GAPs in Germany, Latvia, the Netherlands, Poland, Switzerland and the United Kingdom for small fruits and berries is up to three applications with 0.12 to 0.14 kg ai/ha each and a PHI of three days. The Meeting decided to make a recommendation for the whole group of berries and other small fruits except grapes based on the combined data for protected strawberries, currants and raspberries.

For protected strawberries, currants and raspberries the combined results were 0.04, 0.05, 0.08, 0.1, 0.13, 0.15, 0.15, 0.16, 0.21, 0.21, 0.22, 0.27, 0.28, 0.31(4), 0.33, 0.34, 0.34, 0.35, 0.37, 0.59 and 0.62 mg/kg.

Based on residue data for protected strawberries, currants and raspberries the Meeting recommends a maximum residue level of 1 mg/kg, a STMR of 0.275 mg/kg and a HR of 0.62 mg/kg for thiacloprid in berries and other small fruits except grapes.

#### *Kiwi fruits*

The Meeting received information on supervised residue trials on kiwi fruits from New Zealand.

GAP in New Zealand for kiwi fruit is up to two applications with 0.0096 kg ai/hL each before the flowering. The residues from nine supervised trials in New Zealand matching the GAP ( $\pm 30\%$ ) were: < 0.02 (5), 0.03, 0.04, 0.06 and 0.1 mg/kg.

The Meeting recommended a maximum residue level of 0.2 mg/kg, an STMR value of 0.02 mg/kg and a HR of 0.1 mg/kg for thiacloprid in kiwi fruits.

#### *Onions*

The Meeting received information on supervised residue trials on onions from Brazil and Germany.

GAP in Belize, Brazil, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama for onions is up to 0.1 kg ai/ha and a PHI of 21 days. Only one supervised residue trial from Brazil matched this GAP. The corresponding residue was < 0.02 mg/kg in bulb onion. From Germany two additional trials were provided with residues of < 0.01 and < 0.01 mg/kg.

The Meeting concluded that the data available for onions was not sufficient to support an STMR or MRL recommendation.

#### *Garlic*

The Meeting received information on supervised residue trials on garlic from Brazil.

GAP in Belize, Brazil, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama for garlic is up to 0.1 kg ai/ha and a PHI of 21 days. Neither of the two supervised residues trials matched the GAP for garlic within  $\pm 30\%$ .

The Meeting concluded that the data available for garlic was not sufficient to support a recommendation.

#### *Cucumbers*

The Meeting received information on supervised residue trials on field and glasshouse grown cucumbers from Belgium, France, Germany, Greece, the Netherlands, Italy and Spain.

The GAP for field use in Croatia, Cyprus, Georgia, Greece, Italy, the Netherlands and Spain for cucumbers is up to four applications at 0.12 to 0.15 kg ai/ha each and a PHI of one to three days. The residues from eight supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were: 0.02, 0.03(3), 0.04, 0.1, 0.11 and 0.14 mg/kg.

The GAP for glasshouse use in the United Kingdom for cucumbers, which reflects the critical GAP, is up to three applications at 0.21 kg ai/ha each and a PHI of three days. The residues from 12

supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were 0.04, 0.04, 0.07, 0.07, 0.08(4), 0.12, 0.15, 0.15 and 0.18 mg/kg.

The Meeting decided to pool the data from outdoor and indoor residues trials for a recommendation on cucumbers. The combined results are 0.02, 0.03(3), 0.04(3), 0.07, 0.07, 0.08(4), 0.1, 0.11, 0.12, 0.14, 0.15, 0.15 and 0.18 mg/kg.

For gherkins, GAPs from Greece and the Netherlands were available, which correspond to the GAPs for cucumber. The Meeting concluded that an extrapolation of the data from cucumbers to gherkins is not possible, because of the different surface area-to-mass ratio for gherkins, from higher residues can be expected than in cucumbers.

Based on the combined data for cucumbers the Meeting recommended a maximum residue level of 0.3 mg/kg, an STMR value of 0.08 mg/kg and a HR of 0.18 mg/kg for cucumbers.

#### *Squash, summer*

The Meeting received GAPs for courgettes and squash corresponding to the uses in cucumbers and gherkins. The treatment methods cover foliar spraying as well as drip application. The Meeting concluded that the residue data for cucumber can be extrapolated to summer squash.

Based on an extrapolation from cucumbers the Meeting recommended a maximum residue level of 0.3 mg/kg, an STMR value of 0.08 mg/kg and a HR of 0.18 mg/kg for thiacloprid in summer squash.

#### *Melons and watermelons*

The Meeting received information on supervised residue trials on melons from France, Greece and Italy. Data on protected melons was also received from Japan.

GAP in Croatia, Italy and Spain for melons and watermelons is up to three applications at 0.14 kg ai/ha each and a PHI of three to four days. The residues for whole melon fruits from six supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were  $< 0.02$ , 0.02, 0.03, 0.05, 0.06 and 0.06 mg/kg. In melon pulp all residues were  $< 0.02(6)$  mg/kg.

GAP in Japan for protected melons is up to three applications at 0.45 kg ai/ha each and a PHI of one day. The residues from two supervised trials in Japan matching the GAP ( $\pm 30\%$ ) were  $< 0.005$  and  $< 0.005$  mg/kg in the pulp.

Field trials on watermelons were available from Greece and Spain. Data on protected watermelons was also available from Japan.

GAP in Croatia, Italy and Spain for watermelons is up to three applications at 0.14 kg ai/ha each and a PHI of three to four days. The residues for whole watermelon from four supervised trials in Europe matching the GAP ( $\pm 30\%$ ) were  $< 0.02(3)$  and 0.06 mg/kg. In watermelon pulp all residues were  $< 0.02(4)$  mg/kg.

GAP in Japan for protected watermelons is up to three applications at 0.45 kg ai/ha each and a PHI of one day. The residue trials from Japan were conducted with an application rate of 0.3 kg ai/ha, which did not correspond to the submitted GAP.

The Mann-Whitney-U test for melons and watermelons indicated that a similar distribution for melons and watermelons can be assumed. The combined residues for whole melons and watermelons were  $< 0.02(4)$ , 0.02, 0.03, 0.05, 0.06, 0.06 mg/kg.

The Meeting decided to pool the data for melons and watermelons for mutual support and recommended a maximum residue level of 0.2 mg/kg for thiacloprid in melons and watermelons and an STMR of 0.02 mg/kg and HR value of 0.02 mg/kg for melon and watermelon pulp.

*Squash, winter*

GAP in Cyprus and the Netherlands for squash, field and glasshouse grown, is up to four applications at 0.014 kg ai/hL and a PHI of one to three days. This use corresponds to the GAP available for melons and watermelons in field. The Meeting concluded that the residue data for melon and watermelon can be extrapolated for use in winter squash.

Based on an extrapolation from melon and watermelon the Meeting recommends a maximum residue level of 0.2 mg/kg for thiacloprid in winter squash and an STMR of 0.02 mg/kg and HR value of 0.02 mg/kg for winter squash pulp.

*Tomatoes*

The Meeting received information on supervised residue trials on field and glasshouse grown tomatoes. Supervised trials were provided for field use from France and Italy and for glasshouse use from Germany, France, Japan and Spain. In addition, residue trials with drip application in glasshouse were conducted in Belgium and the Netherlands.

Supervised residue trials of field were conducted with two applications of 0.14 up to 0.22 kg ai/ha each and PHIs from zero to eight days. Corresponding GAPs from Greece and Slovenia were available with a PHI of three days. The residues for tomatoes from seven trials in Europe, matching the GAP ( $\pm 30\%$ ), in ranked order were: 0.02, 0.03, 0.03, 0.04, 0.05, 0.09 and 0.16 mg/kg.

For foliar use in glasshouses, data from eight supervised residue trials were provided corresponding to the GAP of the United Kingdom (three applications at 0.22 kg ai/ha each and a PHI of three days). The residues from protected tomatoes from eight trials in Europe matching the UK GAP ( $\pm 30\%$ ) in ranked order were: 0.07, 0.12, 0.12, 0.15, 0.18, 0.19, 0.25 and 0.29 mg/kg.

GAP in Japan for protected tomatoes is up to three applications with 0.23 kg ai/ha each and a PHI of one day. The residue trials from Japan were conducted with an application rate of 0.38 kg ai/ha, which does not correspond to the submitted GAP.

In the Netherlands drip application to glasshouse tomatoes is registered at an application rate of 0.0096 kg ai per 1000 plants and a PHI of three days. The corresponding residues from eight trials on protected tomatoes in Europe matching the GAP ( $\pm 30\%$ ) were: < 0.02(3), 0.02(3), 0.03 and 0.03 mg/kg.

Based on the glasshouse foliar spray GAP for tomatoes the Meeting recommended a maximum residue level of 0.5 mg/kg, an STMR value of 0.165 mg/kg and a HR value of 0.29 mg/kg for thiacloprid in tomatoes.

*Peppers, sweet*

Supervised residue field trials were provided from France, Italy and Spain. Data for glasshouse use as foliar spray was generated in France, the Netherlands and Spain. In addition, residue trials with drip application in glasshouse were conducted in Belgium and the Netherlands.

Supervised residue trials in field use with thiacloprid were conducted with two applications of 0.14 up to 0.22 kg ai/ha each and PHIs from zero to seven days. Corresponding GAPs from Greece and Slovenia are available with a PHI of three days. The residues for peppers from seven trials in Europe matching the GAP ( $\pm 30\%$ ) in ranked order were: 0.05, 0.06, 0.08, 0.1, 0.11, 0.21 and 0.45 mg/kg.

For the use as a foliar spray in glasshouse eight supervised residue trials were conducted, corresponding to the UK GAP (three applications at 0.22 kg ai/ha and a PHI of three days). The residues for protected peppers from eight trials in Europe matching GAP ( $\pm 30\%$ ) were: 0.07, 0.08, 0.1, 0.11, 0.33, 0.37, 0.37 and 0.38 mg/kg.

GAP in Japan for protected peppers is up to three applications with 0.23 kg ai/ha each and a PHI of one day. The residues from two supervised trials in Japan matching the GAP  $\pm 30\%$  were 1.1 and 2.0 mg/kg. The Meeting compared the data sets for Japan and Europe using the Mann-Whitney-U test and decided that they belonged to different populations and could not be combined. Therefore only data from European trials was used for further evaluation.

In the Netherlands drip application in glasshouses is registered for peppers with an application rate of 0.0096 kg ai per 1000 plants and a PHI of three days. The corresponding residues from eight trials on protected peppers in Europe matching GAP ( $\pm 30\%$ ) were: 0.04, 0.04, 0.05(4), 0.06, 0.07 mg/kg.

For chili peppers GAPs are available, which correspond to the GAPs for sweet peppers. The Meeting concluded that an extrapolation of the data from sweet peppers to chili pepper is not possible, because of the different surface area to mass ratio for chili peppers, for which higher residues than in sweet peppers can be expected.

Based on the glasshouse foliar spray GAP for peppers the Meeting recommended a maximum residue level of 1 mg/kg, an STMR value of 0.22 mg/kg and a HR value of 0.38 mg/kg for thiacloprid in sweet peppers.

### *Eggplants*

Field trials on protected aubergines were provided from Japan.

GAP in Japan for eggplants consists of up to three applications at 0.23 kg ai/ha each and a PHI of one day. The residues from two supervised trials in Japan matching the GAP ( $\pm 30\%$ ) were 0.28 and 0.38 mg/kg.

The Meeting received GAPs for eggplants from the Netherlands, Japan, the United Kingdom and various other countries corresponding to the GAO for field and glasshouse tomatoes. The treatment methods cover foliar spraying as well as drip application. The Meeting concluded that the residue data for tomatoes can be extrapolated to support the use in eggplants.

The Meeting compared the data sets eggplant from Japan and for protected tomatoes using the Mann-Whitney-U test and decided that they belonged to the same population and could be combined. The combined eggplant and protected tomato residues were: 0.07, 0.12, 0.12, 0.15, 0.18, 0.19, 0.25, 0.28, 0.29 and 0.38 mg/kg.

Based on an extrapolation from the critical glasshouse foliar spray GAP for tomatoes and residue trials for eggplants from Japan the Meeting recommended a maximum residue level of 0.7 mg/kg, an STMR value of 0.185 mg/kg and a HR value of 0.38 mg/kg for thiacloprid in eggplants.

### *Potatoes*

The Meeting received information on supervised field trials on potatoes from Belgium, Brazil, France, Germany, Italy, Japan, Spain and the United Kingdom.

The 16 supervised trials available from Europe for potatoes were conducted with up to three applications at 0.096 kg ai/ha each and a PHI of 21 days. This corresponds to the GAP from Austria, Cyprus, Greece, Portugal, Romania, Spain and the United Kingdom. The residues in potato tuber were  $< 0.02(16)$  mg/kg.

GAP in Japan for potatoes is up to three applications with 0.23 kg ai/ha each and a PHI of seven days. The residues from two supervised trials in Japan matching GAP ( $\pm 30\%$ ) were:  $< 0.005$  and  $< 0.005$  mg/kg in the tubers.

In addition the Meeting received information from two supervised residue trials on potatoes from Brazil. The application rates were 0.14 and 0.29 kg ai/ha with a PHI of 21 days. No residue above the LOQ of 0.02 mg/kg was found in potato tubers.

The Meeting recommended a maximum residue level of 0.02 (\*) mg/kg and an STMR value and HR value of 0 mg/kg for thiacloprid in potatoes.

#### *Wheat*

Field trials on wheat were provided from France and Germany.

Thiacloprid is registered for use on wheat in Romania and Lithuania. The application rates are 0.048 kg ai/ha and 0.034 kg ai/ha respectively with a PHI of 21 days for Lithuania and an undefined PHI for Romania. The Meeting received supervised residue trials on wheat with application rates of 0.05 up to 0.062 kg ai/ha, which corresponds to + 29% of the GAP. Residues in wheat grain were < 0.02 (5), 0.03 (3), 0.04 and 0.04 mg/kg.

The Meeting recommended a maximum residue level of 0.1 mg/kg, an STMR value of 0.025 mg/kg and a highest residue value of 0.04 mg/kg for thiacloprid in wheat grain.

#### *Barley*

The Meeting received information from supervised residue trials on barley from France and Germany.

Thiacloprid is registered for on barley in Romania. The application rate is 0.048 kg ai/ha with an undefined PHI. The Meeting received supervised residue trials on barley with application rates of 0.062 kg ai/ha, which corresponds to + 29% of the GAP. Residues in barley grain were < 0.02, 0.05, 0.06, 0.11 and 0.12 mg/kg.

The Meeting decided that there was insufficient data from which to recommend a maximum residue level for thiacloprid on barley.

#### *Rice*

Field trials on rice were provided from India and Japan. GAP in India for foliar spraying of rice is 0.12 kg ai/ha each and a PHI of 30 days. All supervised residue trials were performed, with application rates of 0.18 up to 0.36 kg ai/ha which were up to 3 × GAP. In addition, only the limit of detection of 0.001 mg/kg was reported for thiacloprid in rice. Nevertheless no residues above this LOD were detected in rice grain without husks or in the husks in any of the six supervised residue trials.

GAP in Japan for rice consists of up to three applications with 0.15 kg ai/ha without a PHI. In two residue trials with an application rate of 1.5 kg ai/ha no residue above the LOQ of 0.005 mg/kg could be detected in the grain after 117, and up to 152 days.

The Meeting concluded that the LOQ of the monitoring method (0.02 mg/kg) is an appropriate estimate for MRL values in rice.

The Meeting recommended a maximum residue level of 0.02 (\*) mg/kg, an STMR value of 0 mg/kg and a highest residue of 0 mg/kg for thiacloprid in rice husks.

#### *Maize*

Field trials on maize were provided from France, Germany, Greece and Italy. In Europe GAP is available from Romania (an application rate of 0.048 kg ai/ha and no PHI). Eight supervised residue trials were conducted with two treatments of 0.075 kg ai/ha each and a PHI of 28 – 31 days. These trials did not match any of the GAPs provided to the Meeting.

The Meeting concluded that the residue data on maize was not sufficient for recommending MRL, STMR or HR values.

*Tree nuts*

The Meeting received information on supervised field trials on walnuts from Italy. GAP in Argentina, Chile, Italy and the United Kingdom consists of up to two applications at 0.0096 – 0.018 kg ai/hL and a PHI of 1 to 14 days. The four trials provided were performed at above GAP rate (0.03 kg ai/hL), but no residue could be detected in the nut kernel above the trial specific LOQ of 0.005 mg/kg.

Field trials were provided on almonds from USA.

GAP in Italy and the United Kingdom is up to two applications with 0.012 – 0.018 kg ai/hL and a PHI of 14 days. The residues for almond kernel from 14 trials in the USA matching the GAP ( $\pm 30\%$ ) were: < 0.01(13), 0.01 mg/kg.

Field trials were provided on pecan from USA.

GAP in Italy is up to 0.018 kg ai/hL and a PHI of 14 days. The residues for pecan kernel from 14 trials in USA matching the GAP ( $\pm 30\%$ ) were < 0.01(14) mg/kg.

Various GAPs in Germany, Italy and Turkey for tree nuts consist of up to two applications at rates of 0.0096 to 0.012 kg ai/hL each and a PHI of 21 days. The Meeting concluded that an extrapolation from almonds, walnuts and pecan to the whole group of tree nuts is possible. As thiacloprid is non-systemic, it was concluded that residues in nuts were comparable from different areas in the world. The combined thiacloprid residues in nuts were: < 0.01 (31), 0.01 mg/kg.

Because the analytical methods for enforcement are validated with a LOQ of 0.02 mg/kg, this value is used for the maximum residue level proposal for tree nuts.

The Meeting recommended a maximum residue level of 0.02 mg/kg and an STMR and HR value of 0.01 mg/kg for thiacloprid in tree nuts.

*Oilseed rape and white mustard*

Field trials on oilseed rape were provided from France, Hungary, Germany, Spain and Sweden.

Various GAPs in Czech Republic, Slovakia, Switzerland and the United Kingdom are up to two applications with 0.0096 up to 0.14 kg ai/ha. The residues in rapeseeds from 14 supervised trials matching the GAP  $\pm 30\%$  were < 0.02(3), 0.02, 0.03, 0.05, 0.06, 0.07(3), 0.09, 0.1, 0.22, 0.33 mg/kg.

The GAP in Czech Republic for white mustard is up to two applications with 0.096 kg ai/ha each and no PHI reported. The Meeting concluded that residue trials for rapeseed can be extrapolated to white mustard seed.

The Meeting recommended a maximum residue level of 0.5 mg/kg, an STMR value of 0.065 mg/kg and a HR value of 0.33 mg/kg for thiacloprid in rapeseed and white mustard seeds.

*Cotton seeds*

Field trials on cotton were provided from Greece, Spain and the USA.

For cotton, two sets of supervised residue trials from Europe and USA were made available. The trials conducted in the USA were analyzed using a total residue method measuring 6-CNA. In the European trials total thiacloprid residue, determined as 6-CNA, and thiacloprid only, were analyzed. This data shows clear differences in the residue levels. Therefore the Meeting concluded that the residue data from USA for cotton would not be considered for further evaluation. The residue trials from Europe were conducted with three applications of 0.096 kg ai/ha each and a PHI of 21 days. This use pattern corresponded to GAPs from Greece, Guatemala, Spain and Turkey. The residues in cotton seed from eight supervised trials matching the GAP ( $\pm 30\%$ ) were < 0.02(8) mg/kg.

The Meeting recommended a maximum residue level of 0.02 (\*) mg/kg and an STMR and HR value of 0.02 mg/kg for thiacloprid in cotton seeds.

*Sunflower seeds*

The Meeting received information from one field trial on sunflowers from Hungary.

Registered uses of thiacloprid on sunflowers are available from Hungary and Slovakia. The application rates are 0.036–0.048 kg ai/ha and an undefined PHI and a PHI of 30 days, respectively. The one supervised trial on sunflowers (application rate of 0.097 kg ai/ha) did not correspond to any available GAP.

The Meeting concluded that the available residue data on sunflowers was not sufficient for a recommendation of MRL, STMR or HR values.

*Green tea*

Field trials on green tea were made available from Japan.

GAP in Japan for green tea is one application at 0.6 kg ai/ha and a PHI of seven days. The residue trials from Japan were conducted with an application rate of 0.3 kg ai/ha, which did not correspond to the submitted GAP. The Meeting concluded that a recommendation of maximum residue levels for green tea was not possible.

*Wheat forage*

Field trials on wheat were provided from France and Germany.

Registered uses of thiacloprid on wheat are available from Romania and Lithuania. The application rates are 0.048 kg ai/ha and 0.034 kg ai/ha respectively with a PHI of 21 days for Lithuania and an undefined PHI for Romania. The Meeting received supervised residue trials on wheat with application rates of 0.05 up to 0.062 kg ai/ha, which corresponds to + 29% of the GAP. Residues in wheat forage were: 1.2, 1.2, 1.3(3), 1.7, 1.8, 1.8, 1.9 and 2.2 mg/kg.

The Meeting estimated an STMR value of 1.5 mg/kg and a highest residue value of 2.2 mg/kg for thiacloprid in wheat forage.

*Wheat straw*

Field trials on wheat straw were available from France and Germany.

Registered uses of thiacloprid on wheat straw are available from Romania and Lithuania with application rates of 0.048 kg ai/ha and 0.034 kg ai/ha respectively, with a PHI of 21 days for Lithuania and an undefined PHI for Romania. The Meeting received supervised residue trials on wheat with application rates of 0.05 up to 0.062 kg ai/ha, which corresponded to + 29% of the GAP. Residues in wheat straw were 0.06, 0.07, 0.07, 0.14, 0.53, 0.89, 0.97, 1.2, 1.6 and 1.7 mg/kg.

The Meeting estimated an STMR value of 0.71 mg/kg and a highest residue value of 1.7 mg/kg for thiacloprid in wheat straw.

Based on 88% dry weight matter the residues in wheat straw (dry matter) were 0.07, 0.08, 0.08, 0.16, 0.6, 1.0, 1.1, 1.3, 1.8, 1.9 mg/kg. The Meeting estimated a MRL of 5 mg/kg for wheat straw (dry matter based).

*Almond hulls*

Field trials on almonds were made available from the USA.

GAP in Italy and the United Kingdom is up to two applications with 0.012 – 0.018 kg ai/hL and a PHI of 1 to 14 days. The residues for almond hulls from 14 trials in the USA matching the European GAP ( $\pm$  30%) were 0.99, 1.3, 1.4, 1.5, 1.8, 1.8, 2.0, 2.1, 3.2, 3.3, 3.3, 3.4, 4.5, 4.9 mg/kg.

The Meeting estimated an STMR value of 2.05 mg/kg and a highest residue of 4.9 mg/kg for thiacloprid in almond hulls (fresh weight).

Based on 90% dry weight matter the residues in almond hulls were 1.1, 1.4, 1.6, 1.7, 2.0, 2.0, 2.2, 2.3, 3.5, 3.6, 3.6, 3.7, 5.0 and 5.4 mg/kg. The Meeting estimated a MRL of 10 mg/kg for almond hulls (dry matter based).

#### *Rape forage*

The Meeting received information on supervised residue trials on oilseed rape from France, Hungary, Germany, Spain and Sweden.

Various GAPs in the Czech Republic, Slovakia, Switzerland and the United Kingdom consist of up to two applications at 0.0096 to 0.14 kg ai/ha with PHI between zero and 30 days. The residues in rape forage from 12 supervised trials matching the GAP ( $\pm 30\%$ ) were 1.0, 1.1(4), 1.2, 1.4, 1.5, 1.6, 1.7, 1.9 and 2.2 mg/kg.

The Meeting estimated an STMR value of 1.3 mg/kg and a highest residue of 2.2 mg/kg for thiacloprid in rape forage (fresh weight).

#### *Cotton gin by-products*

Field trials on cotton gin by-products were provided from Greece, Spain and the USA.

For cotton two sets of supervised residue trials from Europe and USA were made available. The residue trials conducted in the USA were analyzed using a total residue method measuring 6-CNA. In the European trials total thiacloprid residue, determined as 6-CNA, and thiacloprid only, were analyzed. Residues analyzed with the total residue method are much higher than thiacloprid only residues and can not be extrapolated to evaluate the residue situation. In the supervised residue trials according to the residue definition "thiacloprid only" no gin trash samples were analyzed. A recommendation for a STMR or highest residue value for cotton gin by-products was not possible.

#### ***Fate of residues during processing***

Thiacloprid was generally stable to hydrolysis during pasteurization, baking and boiling conditions.

Information on the fate of thiacloprid residues during food processing was available for melons and watermelons, apples, peaches, cherries and tomatoes.

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

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factor	Estimate of the processing factor
Apples	Apple, dried	0.3, 0.7	0.5
	Apple, juice	0.2, 0.29	0.25
	Apple, sauce	0.6, 0.86	0.73
	Apple, pomace dry	4.3, 8.7	6.5
Peaches without stone	Peach, preserve	0.22, <u>0.66</u> , 0.66	0.66
Tomatoes	Tomatoes, peeled	0.25, 0.43	0.34
	Tomato, paste	2, 3.1	2.6
	Tomato, juice	0.42, 0.71	0.615
	Tomato, preserve	0.33, 0.71	0.52

For apples the estimated processing factors are applied to the STMR value of 0.11 mg/kg for pome fruits. The Meeting estimated STMR-P values for dried apple of 0.055 mg/kg, for apple juice of 0.0275 mg/kg, for apple sauce of 0.077 mg/kg and for apple pomace dry of 0.71 mg/kg.

For peaches the estimated processing factors are applied to the STMR value of 0.08 mg/kg for stone fruits. The Meeting estimated STMR-P values of 0.05 mg/kg for preserved peaches.

For cherries it was not possible to calculate processing factors as residues in the RAC were below the limit of quantification.

For tomatoes the estimated processing factors are applied to the STMR value of 0.165 mg/kg. The Meeting estimated STMR-P values for peeled tomatoes of 0.056 mg/kg, for tomato paste of 0.429 mg/kg, for tomato juice of 0.1 mg/kg and for tomato preserve of 0.086 mg/kg.

### ***Farm animal dietary burden***

The Meeting estimated the dietary burden of thiacloprid residues for ruminants based on STMR and highest residue values obtained from the submitted supervised residue trials. The diets are described in Appendix IX of the *FAO Manual* (FAO, 2002).

#### *Estimated maximum dietary burden of farm animals*

Crop	Residue (mg/kg)	Basis	Group	Dry matter (%)	Residue/Dry matter (mg/kg)	Dietary content (%)			Residue contribution (mg/kg)		
						Beef cattle	Dairy cows	Poultry	Beef cattle	Dairy cows	Poultry
Apple, dry pomace	0.72	STMR-P	AB	100	0.72	40	20		0.29	0.14	0
Rape, forage	2.2	HR	AM	30	7.33	30	30		2.20	2.20	0
Cottonseed (meal)	0.02	HR	-	89	0.02			20	0.00	0.00	0.004
Wheat, forage	2.2	HR	AF	25	8.80	25	50		2.20	4.40	0
Wheat, grain	0.04	HR	GC	89	0.045	5		80	0.002	0.000	0.036
Total						100	100	100	4.7	6.7	0.04

#### *Estimated median dietary burden of farm animals*

Crop	Residue (mg/kg)	Basis	Group	Dry matter (%)	Residue/Dry matter (mg/kg)	Dietary content (%)			Residue contribution (mg/kg)		
						Beef cattle	Dairy cows	Poultry	Beef cattle	Dairy cows	Poultry
Apple, dry pomace	0.72	STMR-P	AB	100	0.65	40	20		0.29	0.14	0
Rape, forage	1.3	STMR	AM	30	4.33	30	30		1.3	1.3	0
Cottonseed (meal)	0.02	STMR	-	89	0.02			20	0	0	0.004
Wheat, forage	1.5	STMR	AF	25	6.00	25	50		1.5	3	0
Wheat, grain	0.025	STMR	GC	89	0.03	5		80	0.001	0	0.022
Total						100	100	100	3.1	4.4	0.03

The dietary burdens of thiacloprid for estimation of MRL and STMR values for animal commodities are for beef cattle 4.7 and 3.1 mg/kg and for dairy cows 6.7 and 4.4 mg/kg respectively. For poultry a dietary burden of 0.04 and 0.03 mg/kg was calculated.

### ***Farm animal feeding studies***

The Meeting received animal feeding studies on ruminants. No study on poultry feeding was available.

Three groups of cows were dosed at levels equivalent to 2.1 (0.07 mg/kg bw) (1×), 6.2 (0.213 mg/kg bw) (3×) and 20.6 ppm (0.655 mg/kg bw) (10×) of thiacloprid in the diet together with a control group. On average from the cows treated at the 1× dose level, the liver contained the highest thiacloprid residue levels (0.10 mg/kg) followed by kidney (0.03 mg/kg), milk and muscle (0.02 mg/kg) and fat (0.01 mg/kg). Maximum levels for tissues were 0.02 mg/kg for fat, 0.02 mg/kg for muscle, 0.04 mg/kg for kidney and 0.11 mg/kg for liver.

In the second dose group thiacloprid residues increased to an average value of 0.04 mg/kg in milk and fat (highest value 0.04 mg/kg), 0.05 mg/kg in muscle (highest value 0.06 mg/kg), 0.1 mg/kg in kidney (highest value 0.11 mg/kg) and 0.29 mg/kg in liver (highest value 0.32 mg/kg). In the high dose group the residues found were 0.17 mg/kg in milk, 0.12 mg/kg in fat (highest value 0.16 mg/kg), 0.16 mg/kg in muscle (highest value 0.18 mg/kg), 0.27 mg/kg in kidney (highest value 0.32 mg/kg) and 0.94 mg/kg in liver (highest value 1.1 mg/kg).

A linear relation between the dose levels and the residue concentrations was observed.

In milk, residues reached a plateau level within five days and no accumulation was observed.

For poultry no feeding studies were provided. In the metabolism study based on a feeding level of 10 mg/kg bw (corresponding to 124 ppm in feed, based on dry weight) thiacloprid residues of 0.06 mg/kg in eggs, 0.03 mg/kg in muscle, 0.08 mg/kg in fat and 0.54 mg/kg in liver were found.

### ***Animal commodity maximum residue levels***

The dietary burden for beef and dairy cattle was estimated at a maximum level 4.7 and 6.7 mg/kg respectively. The maximum residue level to be expected in tissues can be obtained from the results of feeding at a level of 6.2 ppm.

Dietary burden (mg/kg) <sup>1</sup>	Feeding level [ppm] <sup>2</sup>	Thiacloprid residue level (mg/kg) <sup>3</sup>				
		Milk (mean)	Fat (high)	Muscle (high)	Liver (high)	Kidney (high)
MRL dairy cattle	(6.7) [6.2]	<i>(0.04)</i>	<i>(0.04)</i>	<i>(0.06)</i>	<i>(0.32)</i>	<i>(0.11)</i>
		0.04	0.04	0.06	0.34	0.11
STMR dairy cattle	(4.4) [2.1,6.2]	Milk (mean)	Fat (mean)	Muscle (mean)	Liver (mean)	Kidney (mean)
		<i>(0.02, 0.04)</i>	<i>(0.02, 0.04)</i>	<i>(0.02, 0.05)</i>	<i>(0.1, 0.29)</i>	<i>(0.04, 0.1)</i>
		0.03	0.03	0.035	0.21	0.07

1 In parentheses, estimated dietary burden

2 In square brackets, actual feeding level in transfer studies

3 Values in parentheses in italics are derived from the dietary burden, feeding levels and residue levels found in the transfer studies. "high" is the highest residue level in an individual tissue in the relevant feeding group. "mean" is the mean residue level in milk in the relevant feeding group.

The median dietary burdens were 3.1 mg/kg for beef cattle and 4.4 mg/kg for dairy cattle. The burden for dairy cows is between the dose levels of 2.1 and 6.2 mg/kg of the animal feeding study. Therefore the mean value for each dose group and each commodity is taken for STMR estimation. The values are 0.03 mg/kg for milk, 0.03 mg/kg for mammalian fat, 0.035 mg/kg for mammalian meat and 0.21 mg/kg for edible offal, mammalian. For HR the calculated residues based on the maximum

estimated dietary burden were 0.04 mg/kg for mammalian fat, 0.06 mg/kg for mammalian meat and 0.34 for mammalian edible offal.

Based on the highest residues found in the feeding study (3× dose) the Meeting estimated maximum residue levels of 0.1 mg/kg for mammalian meat and 0.5 mg/kg for mammalian edible offal. Based on the mean value the Meeting estimated a maximum residue level of 0.05 mg/kg for milk.

For poultry no feeding studies are available. When the calculated maximum dietary burden for poultry is extrapolated from the results of the poultry metabolism study the resulting residue levels are far below 0.01 mg/kg. The Meeting estimated an STMR value and a highest residue of 0 mg/kg for thiacloprid in poultry products.

The Meeting estimated a MRL of 0.02 (\*) mg/kg for poultry meat, poultry edible offal and eggs.

## RECOMMENDATIONS

The Meeting estimated the STMR, HR and MRL values shown below.

The definition for the residue in plant and animals (enforcement and risk assessment) is: *thiacloprid*.

The residue is not fat soluble.

Commodity		MRL, mg/kg		HR, mg/kg	STMR or STMR-P, mg/kg
CCN	Name	New	Previous		
AM 0660	Almond hulls	10		5.4	2.05
DF 0226	Apple, dried			0.19	0.055
JF 0226	Apple, juice				0.0275
FB0018	Berries and other small fruits except grapes	1		0.62	0.275
SO 0691	Cotton seed	0.02 (*)		0.02	0.02
VC 0424	Cucumbers	0.3		0.18	0.08
MO 0105	Edible offal, mammalian	0.5		0.34	0.21
VO 0440	Eggplants	0.7		0.38	0.185
PE 0112	Eggs	0.02 (*)		0	0
FI 0341	Kiwi fruits	0.2		0.1	0.02
MF 0100	Mammalian fats, except milk fats			0.04	0.03
MM 0095	Meat, mammalian	0.05		0.06	0.03
VC 0046	Melons	0.2		0.02	0.02
ML 0106	Milks	0.05		-	0.03
SO 0495	Oilseed rape	0.5		0.33	0.065
VO 0445	Pepper, sweet	1		0.38	0.22
FP 0009	Pome fruits	0.7		0.38	0.11
VR 0589	Potatoes	0.02 (*)		0	0
PM 0110	Poultry meat	0.02 (*)		0	0
PO 0111	Poultry, edible offal of	0.02 (*)		0	0
	Rape forage (fresh weight)			2.2	1.3
GC 0649	Rice	0.02 (*)		0	0
VC 4207	Squash, summer	0.3		0.18	0.08

VC 0431	Squash, winter	0.2		0.02	0.02
FS0012	Stone fruits	0.5		0.40	0.08
JF 0448	Tomato, juice				0.1
	Tomato, paste				0.429
	Tomato, peeled				0.056
VO 0448	Tomatoes	0.5		0.29	0.165
TN 0085	Treenuts	0.02		0.01	0.01
VC 0432	Watermelons	0.2		0.02	0.02
GC 0654	Wheat	0.1		0.04	0.025
	Wheat, forage	-		2.2	1.5
AS 0654	Wheat, straw	5		1.7 (fresh matter)	0.71 (fresh matter)
SO 0485	White mustard	0.5		0.33	0.065

## DIETARY RISK ASSESSMENT

### *Long-term intake*

The International Estimated Daily Intakes (IEDI) of thiacloprid based on 13 GEMS/Food regional diets were in the range of 1–10% of the maximum ADI of 0.01 mg/kg bw. The Meeting concluded that the long-term intake of residues of thiacloprid from uses that have been considered by the JMPR is unlikely to present a public health concern.

### *Short-term intake*

The International Estimated Short Term Intake (IESTI) of thiacloprid on the basis of the recommendations made by the JMPR represented 0–90% of the ARfD (0.03 mg/kg bw) for children and 0–30% for the general population. The Meeting concluded that the short-term intake of residues of thiacloprid resulting from uses that have been considered by the JMPR is unlikely to present a public health concern.

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The annual Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and WHO Core Assessment Group on Pesticide Residues was held in Rome, Italy, from 3 to 12 October 2006. The FAO Panel of Experts had met in Preparatory Sessions from 28 September to 2 October. The meeting was held in pursuance of recommendations made by previous meetings and accepted by the governing bodies of FAO and WHO that studies should be undertaken jointly by experts to evaluate possible hazards to humans arising from the occurrence of pesticide residues in foods. During the meeting, the FAO Panel of Experts was responsible for reviewing pesticide use patterns (good agricultural practices), data on the chemistry and composition of the pesticides and methods of analysis for pesticide residues and for estimating the maximum residue levels that might occur as a result of the use of the pesticides according to good agricultural practices. The WHO Core Assessment Group was responsible for reviewing toxicological and related data and for estimating, where possible, acceptable daily intakes (ADIs) of the pesticides for humans. This report contains information on ADIs, maximum residue levels and general principles for the evaluation of pesticides. The recommendations of the joint meeting, including further research and information, are proposed for use by Member Governments of the respective agencies and other interested parties.

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