CHLORANTRANILIPROLE (230)

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Chlorantraniliprole is a novel insecticide belonging to the class of selective ryanodine receptor agonists and was evaluated for the first time by JMPR in 2008 (T, R). The compound was listed for additional MRLs by the 2010 JMPR at the Forty-first Session of the CCPR. The Meeting received information on chlorantraniliprole methods of residue analysis, national registered use patterns, supervised residue trials and fate of residues in processing. The 2008 JMPR established an ADI and ARfD for chlorantraniliprole of 0–2 mg/kg bw/day and "not required" respectively.

METHODS OF RESIDUE ANALYSIS

A number of different analytical methods were reported by the 2008 JMPR for the analysis of chlorantraniliprole in plant and animal matrices. The basic approach employs extraction by homogenisation with acetonitrile:water, and column clean-up using hydrophilic-lipophilic balanced polymeric (HLB) and strong anion exchange (SAX) SPE columns in sequence. Residues are determined by gas chromatography (GC) with an electron capture detector (ECD) or liquid chromatography with mass spectrometric detection (MS/MS).

An additional LC/MS/MS method has been reported for the analysis of chlorantraniliprole in field trials from Brazil (Volpi and Terada 2009). Residues of chlorantraniliprole in diverse crops including citrus (fruit and juice) are determined by liquid chromatography with mass selective detection using a triple quadrupole mass spectrometer (LC/MS/MS). Chlorantraniliprole is extracted from the samples in two stages: the first by soaking the samples in water for 20 minutes, followed by the addition of acetonitrile. The first extract is decanted and further acetonitrile is added for a second extraction. The two extractions are combined. An aliquot is taken, evaporated to dryness and redissolved in acetonitrile and water. The resulting solution is filtered through a 0.22 µm filter. Quantification is performed using liquid chromatography with a triple quadrupole mass selective detector (LC/MS/MS). Recoveries for samples of citrus fruit and juice fortified at 0.01–0.1 mg/kg were acceptable.

Table 1 Validation data for analytical methods for the determination of chlorantraniliprole in food of plant origin (dos Santos Draetta *et al.*, 2008)

Matrix	Fortification level (mg/kg)	n	Average Recovery (%)	Standard Deviation	% RSD
Citrus, whole fruit	0.01	7	94	7.2	8
	0.1	6	97	5.8	6
	0.5	5	92	3.3	4
Citrus juice	0.01	7	87	4.3	5
	0.1	5	96	3.5	4

Apparent residues of chlorantraniliprole in control samples remained below the limit of quantification, and in most samples were not detectable. The limit of quantification of the method for citrus whole fruit and juice is 0.01 mg/kg, as defined by the lowest fortification level tested with acceptable recovery and precision.

USE PATTERNS

Formulations containing chlorantraniliprole are registered for use on a wide variety of crops in over 60 countries around the world. Registered uses include as a foliar spray on vegetables, pome and stone fruit, tree nuts and cotton and as a seed treatment for rice.

Table 2 Registered uses of chlorantraniliprole

Crop	Country	Form		Spray, L/ha	Spray conc, g ai/hL	Rate, g ai/ha	No.	Interval	PHI (days)
Beans, pole	Philippines	SC	F	600–800	0.38	37.5	2–4	5	1
Brassica vegetables [a]	USA	SC	Soil			73	2		3
Brassica vegetables [a]	USA	SC	DC			110/crop max 148	2	10	3
Brassica vegetables [a]	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	3	3
Brassicas	Australia		F	200–1000		40	2	7	7 [b]
Brassicas	Canada	SC	F	> 100		100/season max 200	4	3	3
Brassicas	NZ	SC	F			20	3	7	7 [b]
Brassicas	Spain		F	200–800		35	2	7	1
Cabbage	Brazil		F	800	2	16	3	7	1
Caneberry	Canada	WG	F	500		100/season max 225	3	14	3
Caneberry	USA	WG	F	280–1871		110/season max 225	3	14	3
Citrus	Brazil	ZC	F	2000 [f] 10–30 [e]	1–3	20–60	2	21	5
Citrus	Brazil	SC	Soil			120–240	1		5
Citrus	South Africa	SC	F	2000–8500	3.5	70–297.5	2	30	7
Citrus	USA	WG	F	280–1871		110/season max 225	3	7	1
Corn	Brazil		F	150–250 [f] 40 [e]		25	3	14	14
Corn (field, pop)	Canada	SC	F	> 100		100/season max 225	4	7	14
Corn (field, pop)	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	7	14
Corn (sweet)	Canada	SC	F	> 100		100/season max 225	4	1	1
Corn (sweet)	Hungary	SC	F	400–1000		30	2	14	BBCH 87 [d]
Corn (sweet)	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	1	1
Grapes	Australia		F	> 250	3.15		2	14	56 [b]
Grapes	Canada	WG	F	> 450		100/season max 225	3	7	14
Grapes	USA	WG	F	280–1871		110/season max 221	4	7	14
Legume vegetables	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	3	1
Mint	Canada	SC	F	> 100		50/season max 225	4	14	3
Non-grass animal feed	Canada	SC	F	> 100		100/season max 225	1 cutting	–	0
Non-grass animal feeds (Alfalfa etc)	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	1 cutting	14	0
Peppermint tops and spearmint	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	14	3 [e]

Crop	Country	Form		Spray, L/ha	Spray conc, g ai/hL	Rate, g ai/ha	No.	Interval	PHI (days)
tops									
Soya	Brazil		F	1000	1.5	15	3	7–14	1
Soya bean	Argentina	SC	F	800–1000 [f] > 10 [e]		4–6	2		15
Soya bean	Brazil	SC	F	150–200 [f] 40 [e]		10	2	14	21
Soya bean (pulse)	Japan	SC	F	1000–3000	1.25	37.5	3	7	7
Soya bean green pods	Japan	SC	F	1000–3000	1.25	37.5	3	7	3
Strawberry	Japan	SC	F, gr	1000–3000	2.5	75	2	7	1
Strawberry	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	7	1
Sugar cane	Brazil	WG	Soil	300		157.5	1		
Sugar cane	Brazil	WG	F	150–250 [f] 40 [e]		21	1		60
Sugar cane	USA	SC	F	> 94 [f] > 47 [e]		73/season max 225	4	7	14
Sweet corn	Hungary	SC	F	400–1000		30	2	14	BBCH 87
Table grapes	Spain		F	600–1200	3.5		2	10	3
Tree nuts	Canada	WG	F	> 450		100/season max 225	4	7	10
Tree nuts	USA	WG	F	280–1871		110/season max 221	4	7	10

[a] Broccoli, Chinese broccoli, broccoli raab, Brussels sprouts, cabbage, Chinese cabbage, Chinese mustard, cauliflower, cavalo broccoli, collards, kale, kohlrabi, mizuna, mustard greens, mustard spinach, rape greens

[b] For best performance use an effective adjuvant

[c] Do not use with an adjuvant

[d] It is recommended that a spray adjuvant be used

[e] application using aircraft

[f] ground based applications

Method: F = foliar; Soil = soil at planting; DC = drip chemigation; gr = crop grown under protected cover, eg greenhouse, fld = field grown crop

RESIDUES RESULTING FROM SUPERVISED TRIALS

Chlorantraniliprole is an insecticide belonging to the anthranilic diamide class of chemistry. It is active against a broad range of lepidopteran larvae and certain other insects.

The Meeting received information on supervised field trials for chlorantraniliprole on the following crops:

Commodities	Table No.
Citrus fruit	Tables 3–4
Berries and small fruit	Tables 5–6
Brassica and cole vegetables	Tables 8–10
Legume vegetables	Tables 11–14
Sweetcorn and maize	Tables 15–17
Pulses	Tables 18–19
Root and tuber vegetables	Tables 20–21

Commodities	Table No.
Sugar cane	Table 22
Tree nuts	Table 23
Mint	Table 24
Legume animal feeds	Table 25
Corn fodder	Table 26
Corn forage	Tables 27–28
Almond hulls	Table 29

Where duplicate field samples from an unreplicated plot were taken at each sampling time and were analysed separately, the mean of the two analytical results was taken as the best estimate of the residues in the plot and the means are recorded in the tables. Application rates and spray concentrations have generally been rounded to two significant figures. Limited rounding has been used to facilitate the best use of the data in exploring statistical methods of estimation of maximum residue levels. Residue values from the trials conducted according to maximum GAP have been used for the estimation of maximum residue levels. Those results included in the recommendation of maximum residue levels are underlined.

Conditions of the supervised residue trials were generally well reported in detailed field reports. Most trial designs used non-replicated plots. Most field reports provided data on the sprayers used, plot size, field sample size and sampling dates.

Citrus fruit

Eight decline trials were conducted in the Republic of South Africa (RSA) in the 2009 growing season using a 20 SC formulation applied as two foliar sprays at 3.5 g ai/hL in 2700–8500 L water/ha resulting in applications of 95–296 g ai/ha. No surfactants/additives were included in the spray mixture. Trial plots comprised five to eight trees. All samples were analysed within four months of harvest using GC with electron capture detection (method 13291). Analyses were completed within 6 months of the first samples being collected.

In trials conducted in Brazil, chlorantraniliprole was applied as a soil drench application of a chlorantraniliprole/thiamethoxam SC formulation at 1 g ai/plant followed by three foliar applications of a chlorantraniliprole/lambda-cyhalothrin ZC formulation at 3.0 g ai/hL applied in spray volumes of 2000 L/ha (60 g ai/ha). Intervals between all treatments were 21 days. The Brazil trial plots were 126 to 168 m^2 with application by motorised knapsack sprayer or a Jacto-knapsack mistblower. Samples comprising 20 fruit per collection time were analysed within 84 days of harvest and were kept at –20 °C between harvest and analysis. Half the fruit samples were used for juicing. Fruit and juice samples were analysed using an LC/MS/MS method (MET.0.96.Rev4), LOQ 0.007 mg/kg, LOD 0.002 mg/kg (juice LOQ 0.004, LOD 0.001 mg/kg). Recoveries for fruit samples fortified at 0.01, 0.1 and 0.5 mg/kg were 96 ± 7%, 97 ± 7% and 92 ± 4% respectively and for juice at 0.01 and 0.1 mg/kg were 87 ± 4% and 96 ± 5% respectively.

Table 3 Residues of chlorantraniliprole in citrus from Brazil trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg) Fruit	Residue (mg/kg) Juice	Reference
Orange										
Sitio Laranjal, Limiera SP, Brazil (2008) Bahia		4 (10, 22,21)	360 [a] 60 60 60	– 3 3 3	 2000 2000 2000	70–71 71–75 76–78 79	0 5 7 10 14	0.08 0.08 0.09 0.07 0.09	0.02 0.03 0.01 0.02 0.01	M08043

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg) Fruit	Residue (mg/kg) Juice	Reference
Mogi Guaçu, Holambro, Brazil (2008) Pera Rio		4 (10, 22,21)	360 [a] 60 60 60	– 3 3 3	 2000 2000 2000	70–71 71–75 76–78 79	0 5 7 10 14	0.12 0.15 0.12 0.10 0.13	0.01 0.02 0.03 0.02 0.02	M08043
Decsalvado, Holambro, Brazil (2008) Valência Americano		4 (xx,21, 21)	360 [a] 60 60 60	– 3 3 3	 2000 2000 2000	70–71 71–75 76–78 79	0 5 7 10 14	0.10 0.13 0.09 0.09 0.07	0.03 0.02 0.01 0.02 0.02	M08043
Monte Alegre de Minas, Uberlandia, Brazil (2008) Pera Rio		4 (21,21, 22)	475 [a] 60 60 60	– 3 3 3	 2000 2000 2000	76 78 80 81	0 5 7 10 14	0.04 0.06 0.06 0.09 0.09	< 0.01 0.01 < 0.01 < 0.01 < 0.01	M08043

[a] Soil drench rate for Trials 1–3 = 1 g ai/plant × 1 plant/(7 m × 4 m) × 104 m2/ha = 360 g ai/ha;
Soil drench rate for Trial 4 = g ai/plant × 1 plant/ (6 m × 3.5 m) × 104 m2/ha = 475 g ai/ha
NOTE: all trials + 0.025% mineral oil or vegetable oil

Table 4 Residues of chlorantraniliprole in citrus from Republic of South Africa trials

Location (year) variety	FL	N	g ai/ha	g ai/hL	L/ha	PHI	Peel	Residue (mg/kg) Flesh	Residue (mg/kg) Fruit	Reference
Nelspruit, Mpumalanga, RSA (2009) navel Bahia	SC	2 (30)	116 158	3.5 3.5	3324 4525	–0 0 3 7 14 21	0.23 0.72 0.40 0.58 0.46 0.44	0.03 0.07 0.08 0.07 0.09 0.07	0.07 0.25 0.17 0.22 0.20 0.18	2418-D80
Nelspruit, Mpumalanga, RSA (2009) navel Palmer	SC	2 (30)	95 123	3.5 3.5	2725 3500	–0 0 3 7 14 21	0.14 0.30 0.58 0.40 0.49 0.19	0.02 0.02 0.07 0.05 0.03 < 0.01	0.04 0.10 0.21 0.15 0.15 0.06	2418-D80
Tzaneen, Limpopo, RSA (2009) Valencia Bennie	SC	2 (30)	214 214	3.5 3.5	6116 6116	–0 0 3 7 14 21	0.27 0.57 0.86 0.74 0.52 0.46	0.02 0.04 0.05 0.06 0.11 0.04	0.08 0.18 0.25 0.22 0.22 0.16	2418-D80
Tzaneen, Limpopo, RSA (2009) Valencia Du Roi	SC	2 (30)	296 296	3.5 3.5	8466 8466	–0 0 3 7 14 21	0.38 0.71 0.68 0.78 0.58 0.60	0.05 0.06 0.11 0.08 0.08 0.07	0.14 0.25 0.27 0.27 0.21 0.23	2418-D80
Addo, Eastern Cape, RSA (2009) Tangelo Nova tangelo	SC	2 (30)	293 295	3.5 3.5	8375 8423	–0 0 3 7 14 21	0.36 0.87 0.91 0.72 0.81 0.68	0.03 0.06 0.08 0.04 0.05 0.05	0.10 0.26 0.31 0.22 0.25 0.20	2418-D80
Addo, Eastern Cape, RSA (2009) mandarin Nules Clementine	SC	2 (30)	295 295	3.5 3.5	8423 8423	–0 0 3 7 14 21	0.31 0.77 0.72 0.57 0.60 0.62	0.06 0.07 0.07 0.06 0.07 0.04	0.10 0.24 0.23 0.18 0.18 0.16	2418-D80

Location (year) variety	FL	N	g ai/ha	g ai/hL	L/ha	PHI	Peel	Residue (mg/kg) Flesh	Fruit	Reference
Paarl, Western Cape, RSA (2009) mandarin Satsuma	SC	2 (30)	295 295	3.5 3.5	8429 8429	–0 0 3 7 14 21	0.53 0.75 0.79 0.91 0.89 1.1	0.02 0.05 0.04 0.03 0.05 0.07	0.16 0.24 0.24 0.32 0.27 0.35	2418-D80
Wellington, Western Cape, RSA, (2009) mandarin Nules	SC	2 (30)	247 247	3.5 3.5	7053 7053	–0 0 3 7 14 21	0.25 0.47 0.48 0.41 0.44 0.41	nd 0.04 0.03 0.03 0.03 0.06	0.07 0.16 0.16 0.13 0.13 0.14	2418-D80

Growth stage not specified; application to foliage made with spraying to the point of runoff

Berries and small fruit

Caneberries

Trials on caneberries were conducted in Canada and the USA in 2006 using a WG formulation of chlorantraniliprole. No surfactants or spray additives were used. Plot sizes were 18–178 m^2. Applications were made using airblast sprayers (backpack sprayers and waste pack sprayers). Samples were stored frozen for a maximum of 205 days prior to analysis. Analysis of samples was by LC-MS/MS with recoveries for samples fortified at 0.01–1 mg/kg ranging from 88 to 111%, mean 95 ± 5.8% (n = 18).

Table 5 Residues for chlorantraniliprole in caneberries from Canadian and USA trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Kingsburg, CA, USA (2006) Blackberry Apache	W G	2 (14)	109 112		748 757	Fruiting Fruiting	3	0.049	IR-4 09344
Jackson Springs, NC, USA (2006) Blackberry Kiowa	W G	2 (14)	111 112		467 467	Fruiting Fruiting	3	0.436	IR-4 09344
Bridgeton, NJ, USA (2006) Raspberry Canby Red	W G	2 (14)	113 112		495 486	Fruiting Fruiting	3	0.235	IR-4 09344
Abbotsford, BC, Canada (2006) Raspberry Chemainus	W G	2 (14)	118 115		673 669	Fruiting Fruiting	3	0.481	IR-4 09344
Aldergrove, BC, Canada (2006) Raspberry Malahat	W G	2 (14)	115 117		639 639	Fruiting Fruiting	3	0.482	IR-4 09344
Abbotsford, BC, Canada (2006) Raspberry Meeker	W G	2 (14)	112 114		612 658	Fruiting Fruiting	3	0.513	IR-4 09344
Branchton, ON, Canada (2006) Raspberry Boyne	W G	2 (14)	113 115		607 618	Fruiting Fruiting	3	0.095	IR-4 09344

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Freleighsburg, QC, Canada (2006) Raspberry Killarney	W G	2 (14)	111 115		690 714	Fruiting Fruiting	1 3 7 10	0.090 0.073 0.091 0.059	IR-4 09344

Strawberries

Trials on strawberries grown under protected cover were conducted in Japan using a SC formulation of chlorantraniliprole. Spray additives (Mairinoh or Gramin S) were added to the spray mixture. Plot sizes were 33 to 38 m^2. Application was with small plot sprayers. Analysis was by GC-MS with recoveries for samples fortified at 0.01–0.5 mg/kg ranging from 101 to 109%, mean 104% (n = 12). The storage interval between harvest and analysis was less than 1 month. Samples of strawberries fortified at 0.5 mg/kg were stable for 2 months; average recoveries after 2 months storage at –20 °C were 104%.

Table 6 Residues for chlorantraniliprole in strawberries grown under protected cover from Japan

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Ushiku, Ibaraki, Japan (2006) Tochiotome	SC	2 (7)	50	2.5	2000		1 7 14	0.23 0.16 0.09	26799 (+ Mairinoh)
Nakatsugawa, Gifu, Japan (2006) Akihime	SC	2 (7)	50	2.5	2000		1 7 14	0.30 0.09 0.10	26799 (+ Gramin S)

Brassica and Cole vegetables

Cabbage

Trials were conducted on cabbage in Europe in 2006 and 2007 using a WG formulation of chlorantraniliprole. At some trial locations a plot was also treated with an SC formulation of chlorantraniliprole in order to study the effect of formulation type on residues in cabbage. No additives or surfactants were added to the tank mix. Application was by airblast ground sprayer equipment (backpack sprayers). For the 2006 trials (18770), plot sizes were 18 to 45 m^2. Samples were stored frozen for < 6 months prior to analysis by LC-MS/MS. Recoveries for samples fortified at 0.01 to 0.3 mg/kg were 85–110%, mean 96 ± 8% (RSD 9%, n = 8). In the case of the trials conducted in 2007 (21337), plot sizes were 15–38 m^2 in area. Samples were stored frozen for < 9 months prior to analysis by LC-MS/MS. Recoveries for samples fortified at 0.01 to 0.1 mg/kg were 93–112%, mean 101 ± 8% (n = 4).

An additional four trials were conducted in Europe in 2007 (21628) using a WG formulation of chlorantraniliprole with samples also processed into cooked cabbage and saurkraut. Plot sizes were 25 to 60 m^2. Samples were stored frozen for up to 10 months prior to analysis. Recoveries for samples fortified at 0.01 to 0.1 mg/kg were 95 to 128%, mean 107 ± 15% (n = 4).

Table 7 Residues for chlorantraniliprole in cabbage trials from Europe

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Cabbage										
Villalba del Alcor, Andalucia, Spain (2006) Bronco	WG	2 (6)	29.19 29.90	3.7	779 800	BBCH 47 BBCH 49		1	0.012	18770
Eringhem, Nord Pas-de-Calais,	WG	2 (7)	30.62 29.55	7.58 7.52	404 393	BBCH 48 BBCH 49		–1 h +2 h	< 0.01 0.013	18770
N. France (2006) Brutus		2 (6)	30.62 30.26	7.58 7.58	404 399	BBCH 48 BBCH 49		1	< 0.01	
		2 (7)	30.97 30.26	7.55 7.58	410 399	BBCH 48 BBCH 48		7	< 0.01	
		2 (7)	30.97 31.33	7.55 7.55	410 415	BBCH 48 BBCH 48		14	< 0.01	
		2 (6)	30.26 30.62	7.57 7.58	400 404	BBCH 48 BBCH 48		21	< 0.01	
Tortona, Piemonte, Italy (2006) Famosa	WG	2 (7)	29.19 30.26	3.8 3.8	773 800	BBCH 47 BBCH 49		–1 h +1 h	0.020 0.034	18770
		2 (6)	30.62 29.55	3.8 3.8	808 785	BBCH 47 BBCH 49		1	0.10	
		2 (7)	30.26 30.26	3.8 3.8	798 803	BBCH 42 BBCH 47		7	0.023	
		2 (7)	30.97 31.68	3.8 3.8	822 835	BBCH 42 BBCH 47		14	< 0.01	
		2 (7)	29.90 28.84	3.8 3.8	794 763	BBCH 19 BBCH 19		21	< 0.01	
Poncey les Athée, Bourgogne, N. France (2006) Zerlina	WG	2 (7)	29.90 29.90	3.7 3.8	800 798	BBCH 47 BBCH 49		–1 h +2 h	< 0.01 < 0.01	18770
		2 (7)	29.55 29.90	3.7 3.8	791 798	BBCH 47 BBCH 49		1	< 0.01	
		2 (7)	29.90 29.19	3.8 3.8	796 774	BBCH 45 BBCH 47		7	< 0.01	
		2 (8)	29.19 31.33	3.7 3.8	780 833	BBCH 45 BBCH 45		14	< 0.01	
		2 (6)	30.26 30.62	3.7 3.8	811 814	BBCH 45 BBCH 45		21	< 0.01	
Falenty Nowe, Central Poland	WG	2 (7)	29.19 30.62	3.8 3.8	827 808	BBCH 49 BBCH 49		–1 h +1 h	0.019 0.022	18770
Mazovian Region, Poland (2006) Milstone		2 (8)	29.90 29.55	3.8 3.8	771 796	BBCH 49 BBCH 49		1	< 0.01	
		2 (7)	29.55 29.19	3.8 3.7	787 782	BBCH 49 BBCH 49		7	< 0.01	
		2 (7)	28.84 29.90	3.7 3.8	796 789	BBCH 48 BBCH 49		14	< 0.01	
		2 (7)	30.97 30.26	3.7 3.8	779 813	BBCH 48 BBCH 48		21	< 0.01	
Chalkidona, Thessaloniki, Greece (2006) Magnisias	WG	2 (7)	30.06 30.29	3.8 3.8	797 803	BBCH 47 BBCH 48-49		–1 h +2 h	< 0.01 < 0.01	18770
		2 (7)	30.57 29.91	3.8 3.8	810 793	BBCH 45 BBCH 47-48		1	< 0.01	

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
		2 (7)	30.69 30.31	3.8 3.8	813 803	BBCH 45 BBCH 47-48		7	< 0.01	
		2 (6)	30.94 30.44	3.8 3.8	820 807	BBCH 43 BBCH 45		14	< 0.01	
		2 (8)	30.69 30.69	3.8 3.8	813 813	BBCH 41 BBCH 43		21	< 0.01	
Goch-Kessel, North Rhine — Westphalia, Germany (2006) Buskaro	WG	2 (7)	31.53 30.86	5.03 5.03	627 613	BBCH 47 BBCH 49		1	< 0.01	18770
Seregélyes, Fejér County, Hungary (2006) Júniusi óriás	WG	2 (7)	32.00 31.54	15.00 15.02	213 210	BBCH 48 BBCH 48		1	< 0.01	18770
Eringhem, Nord, North France (2007) Shelton	WG	2 (8)	33.69 34.71	7.0 7.0	480 494	BBCH 46 BBCH 48-49		(–1 h) (+1 h) 1 3	< 0.01 0.029 < 0.01 < 0.01	21337
	SC	2 (8)	33.85 34.62	7.0 7.0	485 497	BBCH 46 BBCH 48-49		1	< 0.01	
Ortwig, Brandenburg, Germany (2007) Cassandra	WG	2 (7)	33.84 34.59	7.0 7.0	483 494	BBCH 48 BBCH 49		(–1 h) (+3 h) 1 3	< 0.01 0.012 < 0.01 < 0.01	21337
	SC	2 (7)	34.30 35.05	7.0 7.0	490 501	BBCH 48 BBCH 49		1	< 0.01	
San Donato Milanese, Lombardia, Italy (2007) Castello	WG	2 (7)	36.13 34.17	7.0 7.0	513 493	BBCH 47 BBCH 49		(–1 h) (+2 h) 1 3	< 0.01 0.014 < 0.01 < 0.01	21337
	SC	2 (7)	33.92 35.32	7.0 7.0	484 507	BBCH 47 BBCH 49		1	0.015	
Nea Magnesia, Thessaloniki, Central Macedonia Greece (2007) Grandslam	WG	2 (7)	35.03 35.14	7.0 7.0	502 503	BBCH 47 BBCH 49		1	0.011	21337
	SC	2 (7)	35.01 35.17	7.0 7.0	501 503	BBCH 47 BBCH 49		1	< 0.01	
North Berwick, East Lothian, UK (2007) Destiny	WG	2 (7)	33.70 33.70	7.0 7.0	482 484	BBCH 46 BBCH 48-49		1	0.095	21337
	SC	2 (7)	35.67 36.37	7.0 7.0	509 519	BBCH 46 BBCH 48-49		1	0.053	
Aubers, Nord, North France (2007) Count	WG	2 (6)	35.93 35.93	7.0 7.0	514 514	BBCH 46-47 BBCH 48-49		1	0.012	21337
	SC	2 (6)	36.30 36.30	7.0 7.0	519 519	BBCH 46-47 BBCH 48-49		1	0.012	

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Poncey-les-Atheè, Bourgogne, France (2007) Zerlina	WG	2 (8)	36.7 35.7	4.4 4.4	836 812	BBCH 47-49 BBCH 49	Heads Cooked Saurkraut Saurkraut juice	1	0.018 < 0.01 < 0.01 < 0.01	21628
Tortona, Piemonte, Italy, (2007) Crauto	WG	2 (6)	35.0 34.6	4.4 4.4	800 791	BBCH 47 BBCH 49	Heads Cooked Saurkraut Saurkraut juice	1	< 0.01 < 0.01 < 0.01 < 0.01	21628
Ortwig, Brandenburg, Germany (2007) Cassandra	WG	2 (7)	34.5 36.1	4.4 4.4	787 825	BBCH 48 BBCH 49	Heads Cooked Saurkraut Saurkraut juice	1	0.04 < 0.01 < 0.01 < 0.01	21628
Lleida, Catalunya, Spain (2007) Beltis	WG	2 (7)	35.3 35.0	4.4 4.4	804 802	BBCH 48 BBCH 48	Heads Cooked Saurkraut Saurkraut juice	1	0.059 < 0.01 < 0.01 < 0.01	21628

Cauliflower and broccoli

Trials were conducted on cauliflower and broccoli in Europe in 2006 and 2007 using a WG formulation of chlorantraniliprole. At some trial locations a plot was also treated with an SC formulation of chlorantraniliprole in order to study the effect of formulation type on residues. No additives or surfactants were added to the tank mix. Application was by airblast ground sprayer equipment (backpack sprayers). For the 2006 trials (18772), plot sizes were 12 to 36 m^2. Samples were stored frozen for up to 7 months prior to analysis by LC-MS/MS. Recoveries for broccoli samples fortified at 0.01 to 0.5 mg/kg were 76–105%, mean 92 ± 11% (RSD 12%, n = 9) and for cauliflower fortified at 0.01 to 0.1 mg/kg were 77–89%, mean 84 ± 5% (RSD 6%, n = 4).

In the case of the trials conducted in 2007 (21338), plot sizes were 30–57 m^2 in area. Samples were stored frozen for up to 9 months prior to analysis by LC-MS/MS. Recoveries for samples of broccoli fortified at 0.01 to 0.2 mg/kg were 82–115%, mean 99 ± 11% (RSD 11%, n = 8) and for cauliflower fortified at 0.01 to 0.1 mg/kg were 84–106%, mean 92 ± 10% (RSD 11%, n = 4).

Table 8 Residues for chlorantraniliprole in broccoli and cauliflower from Europe trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Broccoli									
Olivares, Andalucia, Spain (2006) Monada	WG	2 (7)	30.26 30.26	3.8 3.8	806 805	BBCH 59 BBCH 59	–1 h (0) +2 h (0)	0.14 0.32	18772
		2 (6)	30.26 30.97	3.8 3.8	807 826	BBCH 59 BBCH 59	1	0.37	
		2 (7)	30.62 29.90	3.7 3.8	816 804	BBCH 59 BBCH 59	7	0.18	
		2 (7)	30.26 30.26	3.8 3.7	811 808	BBCH 59 BBCH 59	14	0.052	
		2 (7)	30.26 30.26	3.8 3.8	805 808	BBCH 59 BBCH 59	21	< 0.01	
Settala, Lombardia, Italy (2006) Celsius	WG	2 (8)	30.62 30.62	3.8 3.8	814 815	BBCH 46 BBCH 48	1	0.19	18772

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Goch-Kessel, North Rhine-	WG	2 (7)	29.90 29.41	3.7 3.7	807 800	BBCH 43-45 BBCH 49	–1 h (0) +1 h (0)	0.012 0.13	18772
Westphalia, Germany		2 (7	30.28 30.22	3.7 3.7	803 793	BBCH 43-45 BBCH 47-49	1	0.12	
(2006) Lord		2 (7)	29.66 30.28	3.7 3.7	793 810	BBCH 41 BBCH 43-45	7	0.036	
		2 (7)	30.03 29.66	3.7 3.7	810 808	BBCH 39 BBCH 41	14	0.020	
		2 (7)	30.15 29.90	3.7 3.7	800 787	BBCH 37 BBCH 39	21	< 0.01	
Chalkidona, Thessaloniki, Central Macedonia,	WG	2 (8)	35.19 35.02		503 501	BBCH 45 BBCH 49	(–1 h) (+2 h) 1 3	0.023 0.060 0.088 0.070	21338
Greece (2007) Marathon	SC	2 (8)	35.26 35.13		501 499	BBCH 45 BBCH 49	1	0.10	
St Omer, Nord-Pas-De-Calais, France (2007) Marathon	WG	2 (8)	34.20 34.97	7.0 7.0	491 502	BBCH 48 BBCH 48-49	(–1 h) (+1 h) 1 3	0.019 0.10 0.097 0.064	21338
	SC	2 (8)	34.10 34.91	7.0 7.0	485 496	BBCH 48 BBCH 48-49	1	0.10	
Clacton-on-Sea, Essex, UK (2007) Marathon	WG	2 (7)	35.67 34.97	7.0 7.0	508 497	BBCH 43 BBCH 43-45	(–1 h) (+2 h) 1 3	0.016 0.087 0.12 0.12	21338
	SC	2 (7)	35.52 35.72	7.0 7.0	506 509	BBCH 43 BBCH 43-45	1	0.14	
Velence, Fejér County, Hungary (2007) Calabrese	WG	2 (7)	36.02 35.67	7.0 7.0	517 510	BBCH 49 BBCH 49	1	0.064	21338
Cauliflower									
Chalkidona, Thessaloniki,	WG	2 (7)	30.40 30.13	3.7 3.7	813 806	BBCH 47-48 BBCH 49	–1 h (0) +2 h (0)	< 0.01 0.031	18772
Greece 2006, Siria		2 (7)	30.78 30.10	3.7 3.7	823 805	BBCH 47-48 BBCH 49	1	0.012	
		2 (7)	30.40 30.78	3.7 3.7	813 823	BBCH 46 BBCH 47-48	7	< 0.01	
		2 (6)	30.28 30.65	3.7 3.7	810 820	BBCH 45-46 BBCH 46	14	< 0.01	
		2 (8)	29.75 30.53	3.7 3.7	796 817	BBCH 42-44 BBCH 45-46	20	< 0.01	
Saint-Omer, Nord Pas de Calais, N. France (2006) Aviso	WG	2 (7)	28.84 29.55	7.4 7.5	388 393	BBCH 49 BBCH 49	–1 h (0) +1 h (0)	< 0.01 0.031	18772
		2 (6)	30.62 30.62	7.5 7.5	410 409	BBCH 49 BBCH 49	1	< 0.01	
		2 (7)	29.90 28.84	7.5 7.4	399 388	BBCH 48 BBCH 49	7	< 0.01	
		2 (6)	29.90 30.26	7.5 7.5	400 404	BBCH 41-45 BBCH 48	14	< 0.01	
		2 (8)	29.55 29.90	7.5 7.5	394 400	BBCH 41 BBCH 41-45	20	< 0.01	
Kaputy Ożarów Mazowiecki, Central Poland, Poland (2006) Amerigo	WG	2 (7)	30.97 30.97	3.8 3.8	822 824	BBCH 46 BBCH 48	1	< 0.01	18772

Location (year) variety	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Baisieux, Nord Pas de Calais, N. France, (2006) Nautilis	WG	2 (8	29.90 30.62	7.6 7.6	395 405	BBCH 48 BBCH 49	1	0.082	18772
Baracska, Fejér County, Hungary (2006) Beta	WG	2 (7)	30.99 32.49	15 15	207 217	BBCH 48 BBCH 48	1	0.019	18772
Tortona, Piemonte, Italy (2007) Fremont	WG	2 (6)	33.92 35.32	7.0 7.0	487 505	BBCH 55 BBCH 58	1	0.036	21338
Oderberg, Brandenberg, Germany (2007)	WG	2 (7)	35.80 34.30		511 490	BBCH 47 BBCH 49	(–1 h) (+2 h) 1 3	0.021 0.053 0.045 0.047	21338
Neckarperle	SC	2 (7)	36.53 36.16		522 517	BBCH 47 BBCH 49	1	0.043	

Table 9 Residues for chlorantraniliprole in brassica and cole from Australian and NZ trials reported by the 2008 JMPR

Location, variety	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference Spray additive
Broccoli										
Werribee, Victoria, Broccoli Atomic	SC [b]	3 (7 6)	40 40 40	8.4 8.8 8.0	476 455 500	Head 2.0–5.0 cm Heads 6.0 cm Harvest size	Mature	6[a] 0 3 7 10	0.18 0.49 0.42 0.27 0.19	19726 Agral 0.0125%
Shepparton, Victoria Broccoli Mascot	SC [b]	3 (7 7)	40 40 40	8.0 8.0 8.0	500 500 500	Vegetative Early head Early head	Mature	7[a] 0 3 7 10	0.16 0.39 0.33 0.22 0.15	DPX-E2Y45 Brassica AU Agral 0.0125%
Pukekohe, NZ 2006 broccoli Viper	SC [c]	3 (7 7)	40 40 40	10 10 10	400 400 400	Head ≤ 5 cm Head ≤ 12.5 cm Head ≤ 20 cm	Mature	7[a] 0 3 7 10	0.17 0.28 0.21 0.12 0.04	19727 Actiwet 0.007%
Pukekohe, NZ 2006 broccoli Marathon	SC [c]	3 (7 7)	40 40 40	8.2 8.2 8.1	490 490 492	Head ≤ 5 cm Head ≤ 10 cm Head ≤ 15 cm	Mature	[a] 0 3 7 10	0.04 0.11 0.05 0.07 0.05	19727 Actiwet 0.007%
Cauliflower										
Yanchep, Western Australia, cauliflower, Avron	SC [b]	3 (7 7)	40 40 40	6.4 6.4 6.4	626 626 626	Pre-heading Head 5 cm Head 15 cm	Mature	7	0.23	19726 Agral 0.0125%
Cabbage										
Pozieres, Queensland, Cabbage Camborne	SC [b]	3 (7 7)	40 40 40	5.4 5.4 5.4	737 737 745	Developing head Developing head Developing head	Mature	7	0.17	19726 Agral 0.0125%

Location, variety	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference Spray additive
Broccoli										
Cranbourne, Victoria, cabbage Green cornet	SC [b]	3 (7 7)	40 40 40	7.3 7.3 7.3	550 550 550	Head enlarging Head enlarging Mature	Mature	7	0.20	19726 Agral 0.0125%
The Summit, Queensland, cabbage Drum Head	SC [b]	3 (7 9)	40 40 40	6.5 6.4 6.5	614 626 614	Head developing Head developing Head developing	Mature	7[a] 0 3 7 10	0.08 0.19 0.15 0.13 0.07	DPX-E2Y45 Brassica AU Agral 0.0125%
Pukekohe NZ 2006 cabbage Cabaret	SC [c]	3 (8 7)	40 40 40	10 10 10	400 400 400	Head 10 cm Head 15 cm Head 20 cm	Head 20–25 cm	7[a] 0 3 7 10	0.03 0.09 0.14 0.08 0.06	19727 Actiwet 0.007%
Pukekohe NZ 2006 cabbage Cabaret	SC [c]	3 (7 7)	40 40 40	8.0 8.1 8.1	497 492 493	Head 10 cm Head 15 cm Head 25 cm	Mature	[a] 0 3 7 10	0.02 0.06 0.01 < 0.01 < 0.01	19727 Actiwet 0.007%
Brussels sprouts										
Moriarty, Tasmania, Brussels sprouts Maximus	SC [b]	3 (7 7)	40 40 40	9.8 9.6 9.8	410 416 410	0.4–0.5 cm 1.0–4.0 cm 1.0–4.0 cm	Mature/ semi-mature	7	0.28	19726 Agral 0.0125%
Nairne, South Australia, Brussels sprouts Abacus	SC [b]	3 (6 8)	40 40 40	6.7 6.7 6.7	600 600 600	Forming buttons Forming buttons Maturing buttons		7[a] 0 3 7 10	0.11 0.27 0.28 0.20 0.12	DPX-E2Y45 Brassica AU Agral 0.0125%

[a] sample 6–7 days after 2nd application

[b] Agral ®, a non-ionic surfactant used at 0.125% v/v

[c] Actiwett ® at 0.7% v/v

Table 10 Residues for chlorantraniliprole in brassica and cabbage from USA trials (16570) reported by the 2008 JMPR

Country	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Spray Additive
Broccoli										
Germansville, PA, USA 2005 triathalon	SC	2 (2)	114 115	31 31	374 375	Early/mid head formation	mature	3	0.32	Dyne-Amic (0.5%)
Delavan, WI, USA 2005 Premium Crop	SC	2(3)	114 114	54 56	212 204	48 48	49	3	0.30	X-77 (0.25%)
Branchton, ON, Canada 2005	SC	2 (3)	109 118	45 49	242 239	47 47	47	3	0.40	Agral 90 (0.03%)
St-Marc-sur-Richelieu, QC, Canada 2005 Packman	SC	2 (3)	110 109	44 44	244 247	47 48	49	3	0.38	Citowett Plus (0.25%)

Country	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Spray Additive
Lakeport, CA, USA 2005 Arcadia	SC	2 (4)	110 113	29 30	374 374	49 49	49	3	0.32	Siluet L77 (0.03%)
Madera, CA, USA 2005 Heritage	SC	2 (3)	116 116	41 41	286 286	49 49	49	3	0.41	Penetrator Plus (0.75%)
San Ardo, CA, USA 2005 Patron	SC	2 (3)	114 112	36 36	315 313	78 78–79	79	3	0.35	
Corvallis, OR, USA 2005 Emerald Pride	SC	2 (3)	115 116	27 27	420 422	Head developing Head developing	1st harvest	3	0.12	R-11 (0.25%)
Paynesville, MN, USA 2005 Gypsy	SC	2 (3)	113 114	59 60	191 191	77–79 79	77–79 77–79 77–79 77–79 79 79	–0 +0 1 3 7 10	0.56 0.46 0.67 0.56 0.10 0.042	NIS (0.25%)
Cabbage										
Germansville, PA, USA 2005 Blue Lagoon	SC	2 (3)	115 115	35 35	328 328	Head 15 cm Head 15 cm	mature	3	0.64	Dyne-Amic (0.5%)
Norman Park, GA, USA 2006 Rio Verde	SC	2 (3)	116 118	56 53	209 222	87 87	untrimd trimd 88	3	0.28 0.037	
Needmore, FL, USA 2005 Bravo	SC	2 (4)	116 115	32 32	359 359	48 48	51	3	0.033	Agri-Dex (0.5%)
Rochelle, IL, USA 2005 Blue Gem	SC	2 (3)	112 112	40 40	278 279	47 49	49	3	0.51	
Gardner, ND, USA 2005 Stonehead	SC	2 (3)	114 115	61 60	186 187	46 48	48	3	0.48	
St-Marc-sur-Richelieu, QC, Canada 2005 Stonehead	SC	2 (3)	111 113	45 45	248 253	48 48	49	3	0.066	Citowett Plus (0.25%)
Rougemont, QC, Canada 2005 Bantley	SC	2 (3)	112 104	34 34	333 306	49 49	49	3	0.29	Agral 90 (0.03%)
East Bernard, TX, USA 2005 Early Jersey Wakefield	SC	2 (3)	113 115	48 49	233 235	48 49	Untrimd Trimd 49	3	1.1 0.078	Dyne-Amic (0.5%)
Fresno, CA, USA 2005 Golden Acre	SC	2 (3)	110 113	30 30	369 377	47 48	Untrimd Trimd mature	3	0.75 0.077	
Abbotsford, BC, Canada 2005 Bartolo	SC	2 (3)	112 116	50 50	223 232	70–80 70–80	80–90	4	0.10	

Cabbage untrimd = cabbage with wrapper leaves intact;

Cabbage, trimd = cabbage with wrapper leaves removed.

Legume vegetables

Trials were conducted on green beans grown under protected cover in Europe in 2006 using a WG formulation of chlorantraniliprole. No additives or surfactants were added to the tank mix. Application was by airblast ground sprayer equipment (backpack sprayers). Plot sizes were 24 to

198 m^2. Samples were stored frozen for up to 6 months prior to analysis by LC-MS/MS. Recoveries for samples fortified at 0.01 to 0.3 mg/kg were 70–116%, mean 89 ± 14% (RSD 16%, n = 15).

Table 11 Residues for chlorantraniliprole in beans (protected cover)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Los Palacios y Villafranca, Andalucia, Spain (2006) Oriente	WG	2 (7)	60.16 59.66	4.0 4.0	1505 1505	BBCH 73 BBCH 77	–0 (–1 h) 0 (+ 2 h) 1 7 14 21	0.066 0.10 0.11 0.056 0.079 0.084	18763
Barbate, Andalucia, Spain (2006) Oriente	WG	2 (7)	60.16 60.01	4.0 4.0	1504 1509	BBCH 73 BBCH 77	–0 (–1 h) 0 (+1 h) 1 7 14 21	0.074 0.10 0.13 0.081 0.058 0.077	18763
Saint Chamond, 42400, Rhône-Alpes, France (2006) Hemerite	WG	2 (7)	59.81 59.81	4.0 4.0	1492 1495	BBCH 85 BBCH 85	–0 (–1 h) 0 (+1 h) 1 7 14 21	0.054 0.19 0.14 0.073 0.066 0.014	18763
Pact, Rhône-Alpes, France (2006) Simbel	WG	2 (7)	60.52 60.52	4.0 4.0	1517 1514	BBCH 75 BBCH 75	–0 (–1 h) 0 (+1 h) 1 7 14 21	0.055 0.14 0.15 0.077 0.055 0.014	18763
Bellcaire d'Urgell, Lleida Spain (2006) Kilie	WG	2 (7)	61.59 60.88	4.0 4.0	1541 1522	BBCH 74 BBCH 75	–0 (–1 h) 0 (+1 h) 1 7 14 21	0.046 0.13 0.13 0.071 0.019 0.011	18763
Profitis, Central Macedonia, Greece (2006) Zargana	WG	2 (7)	59.74 60.54	4.0 4.0	1492 1512	BBCH 71 BBCH 77	1	0.11	18763
Nea Magnesia, Central Macedonia, Greece (2006) Zargana	WG	2 (7)	59.64 60.22	4.0 4.0	1489 1504	BBCH 71 BBCH 77	1	0.081	18763
Vittoria, Sicily, Italy (2006) Blue Lake	WG	2 (7)	59.68 61.13	4.0 4.0	1490 1526	BBCH 71 BBCH 73	1	0.11	18763
Vittoria, Sicily, Italy (2006) Bobis	WG	2 (7)	57.72 59.13	4.0 4.0	1441 1477	BBCH 72 BBCH 74	1	0.30	18763

Trials were conducted on field grown green beans in Europe in 2007 using a WG formulation of chlorantraniliprole. No additives or surfactants were added to the tank mix. Application was by airblast ground sprayer equipment (backpack sprayers). Plot sizes were 30 to 60 m^2. Samples were stored frozen for up to 7 months prior to analysis by LC-MS/MS. Recoveries for bean samples fortified at 0.01 to 0.3 mg/kg were 42–97%, mean 81 ± 17% (RSD 21%, n = 8) and

for foliage (plants) samples fortified at 0.01 to 0.1 mg/kg were 64–107%, mean 86 ± 14% (RSD 16%, n = 14).

Table 12 Residues for chlorantraniliprole in beans (field grown)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue Bean pods	(mg/kg) Plant w/o pods	Reference
Los Palacios y Villafranca, Andalucia, Spain (2007) Palacios	WG	2 (7)	40.22 40.91	6.67 6.64	603 616	BBCH 71 BBCH 75	(–1 h) (+2 h) 1 3	0.029 0.072 0.088 0.047	1.1 3.1 3.8 3.9	21334
Manningtree, Essex, UK (2007) Laguna	WG	2 (7)	40.57 38.82	6.63 6.66	612 583	BBCH 76 BBCH 79	1	0.055	2.2	21334
Pusignan, Rhône-Alpes, France (2007) Selecta	WG	2 (7)	39.17 39.52	6.67 6.69	587 591	BBCH 77 BBCH 79	(–1 h) (+1 h) 1 3	0.050 0.25 0.25 0.13	1.0 3.4 3.5 3.4	21334
Herlies, Nord Pas-de-Calais, France (2007) Dexter	WG	2 (7)	40.22 38.12	13.27 13.24	303 288	BBCH 69-71 BBCH 74-75	1	0.031	2.1	21334
Oderberg, Brandenburg, Germany (2007) Primado	WG	2 (7)	40.57 39.14	6.67 6.67	608 587	BBCH 75 BBCH 79	(–1 h) (+2 h) 1 3	0.015 0.049 0.093 0.025	3.5 7.1 5.6 1.6	21334
Rivergaro, Emilia Romagna, Italy (2007) Xsavo	WG	2 (7)	40.22 40.57	6.65 6.66	605 609	BBCH 77 BBCH 79	(–1 h) (1 h) 1 3	0.022 0.18 0.16 0.13	– – 3.8 2.1	21334
Apollonia, Central Macedonia, Greece (2007) Plati	WG	2 (7)	40.68 38.76	6.65 6.65	612 583	BBCH 76 BBCH 79	1	0.12	3.3	21334
Pella, Central Macedonia, Greece (2007) Rosana	WG	2 (7)	40.86 40.68	6.64 6.65	615 612	BBCH 76 BBCH 79	1	0.083	3.1	21334
Velence, Fejèr County, Hungary (2007) Rege	WG	2 (7)	39.19 38.86	5.71 5.71	686 680	BBCH 82 BBCH 89	(–1 h) (1 h) 1 3	– 0.16 0.19 0.10	1.2 3.7 2.6 2.0	21334
Goch, North Rhine-Westphalia, Germany (2007) Artemis	WG	2 (7)	40.45 40.89	6.66 6.67	607 613	BBCH 73 BBCH 77	(–1 h) (3 h) 1 3	0.022 0.072 0.024 0.013	0.89 2.7 0.80 0.83	21334

Two trials on green soya bean were conducted in Japan in 2006. Plot sizes were 18 to 50 m^2. Application was by knapsack sprayers. Analysis of samples was by LC-MS/MS with mean recoveries for samples fortified at 0.01 mg/kg, 104% (n = 6) and samples fortified at 0.5 mg/kg, 105% (n = 6). The interval between sample collection and analysis was less than 14 days.

Table 13 Residues for chlorantraniliprole in green soya beans (seed + pod)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference Spray additive
Miharu-machi, Tamura-gun, Japan (2006) Shin kohiragata chamame	SC	3 (7)	25	1.3	2000	Plant height 45 cm with some initial flowering, 53 cm with all plants flowering, 65 cm with seedpod length 1–3 cm	21	0.04	26804 New Gramin tank mix
		3 (7)	25	1.3	2000	53 cm with all plants flowering, 65 cm with seedpod length 1–3 cm, initial seed ripening	14	0.14	
		3 (7)	25	1.3	2000	65 cm with seedpod length 1–3 cm, initial seed ripening, maturity	3 7	0.15 0.11	
Ishii-cho, Myozai-gun, Japan (2006) Ezomidori	SC	3 (7)	25	1.3	2000	Flowering initial fruiting fruiting	21	0.10	26804
		3 (7)	25	1.3	2000	initial fruiting fruiting initial harvest	14	0.16	
		3 (7)	25	1.3	2000	fruiting initial harvest harvest	3 7	0.32 0.19	

Two trials on pole beans treated with foliar applications of an SC formulation of chlorantraniliprole were conducted in the Philippines in 2006. Plot sizes were 24 m^2. Applications were made using knapsack sprayers. Analysis of samples was by LC-MS/MS with mean recoveries for samples fortified at 0.01 mg/kg, 88% (n = 5) and samples fortified at 0.1 mg/kg, 84% (n = 5). The interval between sample collection and analysis was less than 2 months.

Table 14 Residues for chlorantraniliprole in pole beans

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	
Calauan, Laguna, Philippines (2006) Sandigan	SC	6 (5	20	2.5	800	Fruiting	0 1 3 7 14	3.08 0.057 0.028 0.014 < 0.01	DPX-E2Y45 Pole beans PH
		6 (3	40	5.0	800	fruiting	0 1 3 7 14	11 0.145 0.086 0.033 0.011	

Cereals—sweet corn and maize

Maize and sweet corn trials are reported here as the residues in one crop may be used in support of derived commodities from the other. The corn/maize commodities studied in each region are summarised as follows:

Commodity	Crop
Mature grain	Field corn/maize
Kernels plus cobs	Sweet corn
Forage (whole aerial portion of the plant at late dough/early dent stage (black ring/layer stage for corn only))	Field corn/maize Sweet corn
—equivalent to whole green plant	
Stover (mature dried stalks from which the grain or whole ear (cob plus grain) have been removed)	Field corn/maize Sweet corn
Aspirated grain fractions	Field corn/maize

Trials were conducted on corn in Canada and the USA in 2007 using an SC formulation of chlorantraniliprole. No additives or surfactants were added to the tank mix. Application was by backpack sprayers and tractor mounted booms. Plot sizes were 28 to 2926 m^2. Samples were stored frozen for up to 10 months prior to analysis by LC-MS/MS. Recoveries for corn forage samples fortified at 0.01 to 5 mg/kg were 63–82%, mean 75 ± 8% (n = 4), for grain samples fortified at 0.01 to 0.1 mg/kg were 86–91%, mean 88 ± 2% (n = 4), for stover samples fortified at 0.01 to 5 mg/kg were 68–82%, mean 80 ± 7% (n = 6) and for aspirated grain fraction samples fortified at 0.01 to 0.5 mg/kg were 69–77%, mean 73 ± 4% (n = 3).

Table 15 Residues for chlorantraniliprole in mature corn (maize)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Richland, IA, USA (2007) 33H26	SC	2 (7)	110 112	42 67	264 166	BBCH 60 BBCH 60	Grain	13	< 0.01	21741
		2 (7)	567 599	209 337	271 166	BBCH 60 BBCH 60	Grain	13	< 0.01	
Gardner, ND, USA (2007) 9454349	SC	2 (7)	116 112	75 75	155 150	BBCH 85 BBCH 89	Grain	15	< 0.01	21741
		2 (7)	554 657	374 375	148 151	BBCH 85 BBCH 89	Grain	15	< 0.01	
York, NE, USA (2007) 34A17	SC	2 (7)	111 112	60 60	186 187	BBCH 85 BBCH 87	Grain	14	< 0.01	21741
Branchton, ON, CAN (2007) 38P03	SC	2 (7)	111 112	28 28	400 400	BBCH 77-83 BBCH 80-83	Grain	14	< 0.01	21741
Branchton, ON, CAN (2007) 38N87	SC	2 (7)	110 108	28 27	400 400	BBCH 77-83 BBCH 80-83	Grain	14	< 0.01	21741

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
St. George, ON, CAN (2007) 38N87	SC	2 (7)	105 111	26 28	400 400	BBCH 77-83 BBCH 80-83	Grain	14	< 0.01	21741
Hinton, OK, USA (2007) DKC50-20	SC	2 (7)	110 108	49 48	225 227	BBCH 85-87 BBCH 87	Grain	15	< 0.01	21741

Additional trials were conducted on corn in Canada and the USA in 2007 using an SC formulation of chlorantraniliprole. No additives or surfactants were added to the tank mix. Application was by backpack sprayers, tractor mounted booms, airblast sprayers and mistblower. Kernels and cob with husk removed and forage samples were collected after two applications with grain and stover samples collected after the last of the four applications. The trial conducted at Freeville NY received five sprays and in this case cobs and forage were collected after the third spray with grain and stover collected after the last spray. Plot sizes were 49 to 780 m^2. Samples were stored frozen for up to 9 months prior to analysis by LC-MS/MS. Recoveries for corn forage samples fortified at 0.01 to 10 mg/kg were 94 ± 10% (n = 26), for grain samples fortified at 0.01 to 1 mg/kg were 93 ± 10% (n = 18), for stover samples fortified at 0.01 to 15 mg/kg were 90 ± 9% (n = 30) and for kernels and cob (with husk removed) samples fortified at 0.01 to 1 mg/kg were 96 ± 10% (n = 23).

Table 16 Residues for chlorantraniliprole in immature (sweetcorn) and mature corn (maize)

Location (year) variety	FL	No (interval)	g ai/ha	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Maricopa, AZ (2007) Mexican June	SC	4 (1,35,14)	113 110 112 116	374 364 402 355	Mature with milk stage kernels Fruiting Brown dead Brown dead	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Citra, FL (2007) 31Y42 Field	SC	4 (2,6,8)	121 112 115 116	308 280 290 290	Milk stage Milk stage Past milk stage Corn hardening	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Salisbury, MD (2007) 8921YG1/RR Field	SC	4 (1,27,7)	116 111 111 113	262 262 262 262	Milk stage Milk stage Drying down Ears beginning to droop over	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Holt, MI (2007) Garst 8921YG1/RR	SC	4 (1,21,7)	121 121 118 118	206 196 196 196	Milk stage Milk stage Mature field corn Mature corn	K + CWHR Grain	1 13	< 0.01 < 0.01	IR-4 09732
Fargo, ND (2007) PFS 24A78RR	SC	4 (1,36,7)	112 112 112 112	168 168 168 168	Milk stage Milk stage 50% senesced 80% senesced	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Bridgeton, NJ (2007) 8487YG1/GT	SC	4 (1,21,8)	122 122 121 115	327 355 364 327	Fruiting Fruiting Fruiting Fruiting	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Freeville, NY (2007) Kind Field	SC	5 (12,2,35,8)	113 113 113 113 113	467 467 467 467 467	14–16 leaves 16 leaves 16 leaves 16 leaves 15–16 leaves	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732

Location (year) variety	FL	No (interval)	g ai/ha	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Aurora, OR (2007) Hybrid #296 Field	SC	4 (1,5,8)	113 112 112 115	449 439 449 458	Kernels at milk stage Milk stage Milk stage Dent stage	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Prosser, WA (2007) Stealth 6497	SC	4 (1,47,7)	114 112 113 112	252 252 243 243	Fruiting Vegetative Brown leaves Brown leaves	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Arlington, WI (2007) Renk RK488 Field	SC	4 (1,5,8)	121 122 113 112	299 308 290 290	Tasselling Milking Seeding Mature	K + CWHR Grain	1 13	< 0.01 < 0.01	IR-4 09732
Taber, AB (2007) Canada Canamaize Field	SC	4 (2,13,7)	111 114 115 113	196 206 206 206	BBCH 83-85 BBCH 87-89 Seeding Mature	K + CWHR Grain	1 15	< 0.01 < 0.01	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	4 (1,41,8)	116 110 115 115	561 551 551 551	Cobs at milk stage Cobs at milk stage Mature Mature	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	4 (1,41,8)	111 116 111 114	561 551 551 551	Cobs at milk stage Cobs at milk stage Mature, leaves 50% green Mature, leaves 30% green	K + CWHR Grain	1 14	< 0.01 0.013	IR-4 09732
Branchton, ON (2007) Canada 38P03 Field	SC	4 (1,34,7)	106 113 111 110	336 364 355 346	Milking Milking BBCH 77-83 BBCH 80-83	K + CWHR Grain	1 14	< 0.01 < 0.01	IR-4 09732

K + CWHR = kernels and cob with husk removed

K + CWHR collected PHI after 2nd spray for all trials except Freeville NY where it was after the 3rd spray.

Grain collected at PHI listed after the last spray.

In Europe trials on corn were conducted in the 2006 (20120) growing season using an SC formulation and in the 2007 (21629) growing season using both SC and WG formulations. No additives or surfactants were added to the tank mix. Application was by knapsack and mobile plot sprayers. For the 2006 trials, plot sizes were 12 to 81 m^2. Samples were stored frozen for up to 8 months prior to analysis by LC-MS/MS. Recoveries for corn forage (green plant) samples fortified at 0.01 to 2 mg/kg were 87 ± 12% (n = 12), for grain samples fortified at 0.01 to 0.1 mg/kg were 101 ± 7% (n = 4) and for kernels and cob (with husk removed) samples fortified at 0.01 to 0.1 mg/kg were 91 ± 5% (n = 4).

For the 2007 season trials, plot sizes were 30 to 51 m^2. Samples were stored frozen for up to 9 months prior to analysis by LC-MS/MS. Recoveries for corn forage (green plant) samples fortified at 0.01 to 3 mg/kg were 88 ± 17% (n = 8), for grain samples fortified at 0.01 to 0.1 mg/kg were 93 ± 7% (n = 4) and for kernels and cob (with husk removed) samples fortified at 0.01 to 0.1 mg/kg were 80 ± 5% (n = 4).

Table 17 Residues for chlorantraniliprole in immature (sweet corn) and mature corn (maize)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Antequera, Andalucia, Spain (2006) Zaragoza	SC	2 (50)	31.10 31.31	6.2 6.2	502 505	BBCH 55-57 BBCH 81	Grain	36	< 0.01	20120
Douai, Nord Pas De Calais, France (2006) Cosmos	SC	2 (86)	31.31 30.26	12 12	252 244	BBCH 55 BBCH 83	K + CWHR Grain	7 61	< 0.01 < 0.01	20120
Corteolona, Lombardia, Italy (2006) Eleonora	SC	2 (40)	31.72 31.72	6.2 6.2	514 511	BBCH 55 BBCH 83	K + CWHR grain	7 30	< 0.01 < 0.01	20120
Saint Trivier sur Moignans, Rhône-Alpes, France (2006) DK 5011	SC	2 (50)	30.68 31.31	6.2 6.2	496 506	BBCH 55 BBCH 83-85	K + CWHR Grain	7 39	< 0.01 < 0.01	20120
Rozbity Kamień, PL 09-180, Central Poland, Poland (2006) Delito	SC	2 (56)	31.93 30.89	6.2 6.2	514 499	BBCH 55-59 BBCH 84	Grain	23	< 0.01	20120
Nea malgara, Thessaloniki, Greece (2006) Z98	SC	2 (39)	32.32 31.34	6.2 6.2	522 506	BBCH 55 BBCH 84-85	K + CWHR Grain	7 20	< 0.01 < 0.01	20120
Goch-Nierswalde, North Rhine Westphalia, Germany (2006) Gavott	SC	2 (52)	29.58 31.30	6.2 6.2	478 506	BBCH 55 BBCH 83	K + CWHR Grain	7 45	< 0.01 < 0.01	20120
Kápolnásnyek, County Fejér, Hungary (2006) DK 440	SC	2 (15)	32.04 30.58	6.2 6.2	519 496	BBCH 55 BBCH 82	Grain	62	< 0.01	20120
Térmens, Lleida, Spain (2006) DKC 6575	SC	2 (47)	32.35 30.47	6.2 6.2	521 492	BBCH 55 BBCH 73	Grain	51	< 0.01	20120
Motterwitz, Saxony, Germany (2006) Monumental	SC	2 (43)	32.30 29.80	6.2 6.2	520 480	BBCH 55 BBCH 83	K + CWHR Grain	7 35	< 0.01 < 0.01	20120
Charnay-lès-Macon, Bourgogne, France (2007) Panama	SC	2 (50)	31.46 30.24	6.2 6.2	509 489	BBCH 55 BBCH 83	Grain	34	< 0.01	21629
Graffignana, Lombardia, Italy (2007)	SC	2 (35)	31.46 30.24	6.2 6.2	506 486	BBCH 55-59 BBCH 83	K + CWHR Grain	7 40	< 0.01	21629
Kubric	WG	2 (35)	30.77 31.47	6.2 6.2	500 507	BBCH 55-59 BBCH 83	K + CWHR Grain	7 40	< 0.01 < 0.01	
Saint Martin le Châtel, Rhône-Alpes, France (2007) Lemoro	SC	2 (48)	31.66 30.85	6.2 6.2	510 497	BBCH 55 BBCH 83	Grain	30	< 0.01	21629

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Altreetz, Brandenburg, Germany	SC	2 (44)	32.40 31.16	6.2 6.2	522 502	BBCH 55 BBCH 83	K + CWHR Grain	7 44	< 0.01 < 0.01	21629
(2007) DKC 2960	WG	2 (44)	32.34 31.93	6.2 6.2	520 513	BBCH 55 BBCH 83	K + CWHR Grain	7 44	< 0.01 < 0.01	
Imathia, Central Macedonia, Greece (2007) Z-98	SC	2 (39)	31.01 30.79	6.2 6.2	498 495	BBCH 55 BBCH 83	Grain	21	< 0.01	21629
Goch-Nierswalde, North Rhine Westphalia, Germany (2007) Darlin	SC	2 (74)	31.61 30.36	6.2 6.2	509 489	BBCH 55 BBCH 81	Grain	33	< 0.01	21629
Kápolnásnyék, Fejér County, Hungary (2007) DK 440	SC	2 (24)	31.70 32.04	7.8 7.8	409 413	BBCH 55 BBCH 72	K + CWHR Grain	7 50	< 0.01 < 0.01	21629
	WG	2 (24)	31.43 31.43	7.8 7.8	404 404	BBCH 55 BBCH 72	K + CWHR Grain	7 50	< 0.01 < 0.01	
Térmens, Catalunya, Spain (2007) DKC5784YG	SC	2 (47)	30.45 31.46	6.2 6.2	490 504	BBCH 55 BBCH 83	K + CWHR Grain	7 47	< 0.01 < 0.01	21629
	WG	2 (47)	30.42 30.77	6.2 6.2	491 500	BBCH 55 BBCH 83	K + CWHR Grain	7 47	< 0.01 < 0.01	

K + CWHR = kernels and cobs with husk removed

Pulses

Two trials on soya bean (dry) were conducted in Japan in 2006. Plot sizes were 9.8 to 15 m^2. Application was by small scale sprayers. Analysis of samples was by LC-MS/MS with mean recoveries for grain samples fortified at 0.01–0.5 mg/kg of 97% (n = 12). The interval between sample collection and analysis was less than 4 months.

Table 18 Residues for chlorantraniliprole in soya bean (dry) from Japanese trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference Spray additive
Kiyota, Sapporo, Hokkaido,		3 (7)	25	1.25	2000	pod swelling Initial ripening Ripening stage	Seed	7	0.03	26803 (Gramin 0.01%)
Japan (2006) Toyomusume		3 (7)	25	1.25	2000	pod swelling pod swelling Initial ripening	Seed	14	< 0.01	
		3 (7)	25	1.25	2000	pod swelling pod swelling pod swelling	Seed	21	< 0.01	
Odate, Ajimu Machi, Usa, Oita Pref.,		3 (7)	25	1.25	2000	Leaf fall (15%) Leaf fall (90%) Leaf fall (100%)	Seed	7	< 0.01	26803 (Shindyne 0.03%)
Japan (2006) Murayutaka		3 (7)	25	1.25	2000	Root elongation Leaf fall (15%) Leaf fall (90%)	Seed	14	< 0.01	

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference Spray additive
		3 (7)	25	1.25	2000	Root elongation Root elongation Leaf fall (15%)	Seed	21	< 0.01	

In Brazil, trials on soya bean were conducted in the 2007 growing season using an SC formulation. No additives or surfactants were added to the tank mix. Application was by backpack sprayers. Plot sizes were 60 to 75 m2. Samples were stored frozen for up to 5 months prior to analysis by LC-MS/MS. Recoveries for soya bean grain samples fortified at 0.01 to 0.5 mg/kg were 98% (RSD = 3%).

Table 19 Residues for chlorantraniliprole in soya bean (dry) from Brazil trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Rondonopolis-MT, Brazil (2007) TMG 117 RR	SC	Furrow + 2 foliar (85,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5.3 R6	Seed	21	0.11	RE-2007-049
		Furrow + 2 foliar (71,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R4 R5.3	Seed	35	0.022	
Selviria-MS, Brazil (2007) BRSGO - Chapadões	SC	Furrow + 2 foliar (109,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R7 R8	Seed	7	0.27	RE-2007-196
		Furrow + 2 foliar (102,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R7 R8	Seed	14	0.18	
		Furrow + 2 foliar (95,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R6 R7	Seed	21	0.11	
		Furrow + 2 foliar (88,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5 R7	Seed	28	0.051	
		Furrow + 2 foliar (81,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R4 R6	Seed	35	0.023	
Uberlandia-MG, Brazil (2007) BRS Valiosa RR	SC	Furrow + 2 foliar (91,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R6 R7.3	Seed	21	0.10	RE-2007-197
		Furrow + 2 foliar (77,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R4 R6	Seed	35	0.020	
Primavera do Leste, MT, Brazil (2007) P99R01	SC	Furrow + 2 foliar (109,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R6 R8	Seed	7	0.26	RE-2007-198
		Furrow + 2 foliar (102,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5.5 R7	Seed	14	0.21	
		Furrow + 2 foliar (95,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5.3 R6	Seed	21	0.12	
		Furrow + 2 foliar (88,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5.1 R5.5	Seed	28	0.061	
		Furrow + 2 foliar (81,14)	100 10 10	66.7 6.7 6.7	150 150 150	In furrow R5 R5.3	Seed	35	0.021	

Root and tuber vegetables

Two trials on Japanese radish were conducted in Japan in 2007. Plot sizes were 6 to 15 m^2. Application was by small scale sprayers. Analysis of samples was by LC-MS/MS with mean recoveries for root samples fortified at 0.01 to 0.5 mg/kg of 94% (n = 12) and in tops fortified at 0.01 to 2 mg/kg, 103% (n = 12). The interval between sample collection and analysis was less than 6 months. Samples of roots and tops fortified at 0.5 mg/kg were stable for 7 months; average recoveries after 7 months storage at –20 °C were 100%.

Table 20 Residues for chlorantraniliprole in Japanese radish from Japan trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Nanakubo, Kahoku, Japan (2007) Haruichi	SC	3 (6–7)	50	2.5	2000	Rhizome 5 cm Rhizome 7 cm initial harvest	Roots	1 3 7	< 0.01 < 0.01 < 0.01	26801
							Tops	1 3 7	1.78 0.67 0.28	
		3 (6–7)	50	2.5	2000	Rhizome 3 cm	Roots	15	< 0.01	
						Rhizome 5 cm Rhizome 7 cm	Tops	15	0.10	
Nonami, Fukui, Japan (2007) Taibyou-Soubutori	SC	3 (7,7)	50	2.5	2000	Peak root thickening Final root thickening Initial harvest	Roots	1 3 7	< 0.01 < 0.01 < 0.01	26801
							Tops	1 3 7	1.29 1.13 0.38	
		3 (7,7)	50	2.5	2000	Root thickening Peak root thickening Final root thickening	Roots	14	< 0.01	
							Tops	14	0.56	

Two trials on turnips were conducted in Japan in 2007. Plot sizes were 5 to 38 m^2. Application was by small scale sprayers. Analysis of samples was by LC-MS/MS with mean recoveries for root samples fortified at 0.01–0.5 mg/kg of 97% (n = 12) and in tops fortified at 0.01–2 mg/kg, 92% (n = 12). The interval between sample collection and analysis was less than 4 months. Samples of roots and tops fortified at 0.5 mg/kg were stable for 4 months; average recoveries after 4 months storage at –20 °C were 100%.

Table 21 Residues for chlorantraniliprole in Turnips from Japan trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Ushiku, Ibaraki, Japan (2007) Swan	SC	3 (7,7)	50	2.5	2000	Plant 30 cm high Plant 40 cm high Plant 40 cm high	Roots	1 3 7	< 0.01 0.01 0.01	26800
							Tops	1 3 7	2.75 2.47 1.98	
		3 (7,7)	50	2.5	2000	Plant 30 cm high Plant 30 cm high Plant 40 cm high	Roots	14	0.02	
							Tops	14	1.65	

Location (year) variety	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Nakatsugawa, Gifu, Japan (2007) Swan	SC	3 (7,7)	50	2.5	2000	thickening period thickening period initial harvesting period	Roots	1 3 7	0.03 0.02 0.02	26800
							Tops	1 3 7	3.36 2.68 1.56	
		3 (7,7)	50	2.5	2000	Growth & thickening period thickening period thickening period	Roots	14	0.01	
							Tops	14	1.22	

Sugar cane

In Brazil, trials on sugar cane were conducted in the 2006–2007 growing season using a WG formulation. No additives or surfactants were added to the tank mix. Application was by backpack sprayers. Plot sizes were 70 to 75 m^2. Samples were stored frozen for up to 4.5 months prior to analysis by LC-MS/MS. Recoveries for cane samples fortified at 0.01 to 0.3 mg/kg were 92% (RSD = 3%).

Table 22 Residues for chlorantraniliprole in sugar cane from Brazil trials

Country	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Pirassununga, São Paulo, Brazil (2006-2007) SP-80.1842	W G	2 (120)	157.5 28.0	78.8 11.2	200 250	5–6 leaves 7–8 visible nodes	Stalks	60 90 121	0.16 0.093 0.049	RE-2007-208
Descalvado, São Paulo, Brazil (2006-2007) RB-72.454	W G	2 (120)	157.5 28.0	78.8 11.2	200 250	10–12 leaves 7–8 visible nodes	Stalks	60 90 121	0.16 0.109 0.049	RE-2007-209
Saltinho, São Paulo, Brazil (2006-2007) RB 855453	W G	2 (117)	157.5 28.0	78.8 11.2	200 250	12 leaves 9 visible nodes	Stalks	64	0.13	RE-2007-210
Limeira, São Paulo, Brazil (2006-2007) SP 891115	W G	2 (117)	157.5 28.0	78.8 11.2	200 250	12 leaves 9 nodes	Stalks	64	0.090	RE-2007-211

Tree nuts

Table 23 Residues for Chlorantraniliprole in tree nuts from USA trials reported by the 2008 JMPR

Country	FL	No (interval)	g ai/ha	g ai/hL	L/ha	GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Almond										
Kerman, CA, USA (2006) Nonpareil	WG	2 (7)	112 111	12 12	935 926	Initial drying Drying	Maturity	10	< 0.01	18803
Madera, CA, USA (2006) Nonpareil	WG	2 (7)	114 113	12 12	935 935	Drying Drying	Maturity	10	< 0.01	18803
Glenn, CA, USA (2006) Nonpareil	WG	2 (7)	112 112	12 12	935 935	Hull split	Maturity	10	< 0.01	18803
Terra Bella, CA, USA (2006) Pareil	WG	2 (7)	111 112	12 12	935 945	88 88	89	11	< 0.01	18803
Sanger, CA, USA (2006) Neplus	WG	2 (7)	112 112	12 12	945 935	85 85	89	10	< 0.01	18803
Sultana, CA, USA (2006) Carmel	WG	2 (7)	112 112	12 12	945 945	85 87	89	10	< 0.01	18803
Pecans										
Chula, GA, USA (2006) Sumner	WG	2 (7)	113 113	12 12	935 945	87 87	89	10	< 0.01	18803
Sycamore, GA, USA (2006) Sumner	WG	2 (7)	113 114	12 12	935 945	87 87	89	10	< 0.01	18803
Albany, GA, USA (2006) Sumner	WG	2 (7)	113 114	12 12	935 945	87 87	89	10	< 0.01	18803
Marked Tree, AR,USA (2006) Stuart	WG	2 (7)	113 112	12 11	935 992	95 96	Harvest	10	0.014	18803
Anton, TX, USA (2006) Western Schuley	WG	2 (7)	113 112	12 12	945 935	Shucks splitting Shucks split	Harvest	9	0.015	18803
D'Hanis, TX, USA (2006) Wichita	WG	2 (7)	114 112	13 13	879 870	85 85	89	10	< 0.01	18803

Herbs

In Canada and the USA trials on mint were conducted in the 2006 (IR-4 09342) growing season using a WG formulation. No additives or surfactants were added to the tank mix. Application was by backpack and tractor mounted sprayers. Plot sizes were 46 to 83 m^2. Mint hay samples were processed to produce mint oil at two trials. Samples were stored frozen for up to 66 days prior to analysis by LC-MS/MS. Recoveries for tops (green plant) samples fortified at 0.01 to 10 mg/kg were 95 ± 10% (n = 20) and for mint oil samples fortified at 0.01 to 1 mg/kg were 95 ± 8% (n = 14).

Table 24 Residues for chlorantraniliprole in mint from US trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Portage, WI, USA (2006) Black Mitchem	W G	2 (15)	112 109		742 720	Vegetative vegetative	Tops Oil	3	4.61 < 0.01	IR-4 09342
Portage, WI, USA (2006) Black Mitchem	W G	2 (15)	110 109		730 717	Vegetative vegetative	Tops	3	4.64	IR-4 09342
Moxee, WA, USA (2006) Native Spearmint	W G	2 (14)	114 114		738 744	Vegetative bloom	Tops Oil	3	5.68 < 0.01	IR-4 09342
Moxee, WA, USA (2006) Black Mitchem	W G	2 (14)	109 110		603 603	Bud bloom	Tops	3	5.33	IR-4 09342
Hammett, ID, USA (2006) Black Mitchem	W G	2 (14)	114 115		711 716	Vegetative vegetative	Tops	3	2.22	IR-4 09342

Legume animal feeds

In Canada and the USA fifteen trials on alfalfa were conducted in the 2007 (21740) growing season using an SC formulation. Two applications were made to treated plots at a target rate of 112 g ai/ha, one application per cutting with applications targeting 10% bloom. At thirteen of the fifteen sites a second plot was established and treated with a single application. No additives or surfactants were added to the tank mix. Application was by backpack and tractor mounted sprayers. Plot sizes were 46 to 445 m^2. Samples were stored frozen for up to 7.2 months prior to analysis by LC-MS/MS. Recoveries for forage (green plant) samples fortified at 0.01 to 10 mg/kg were 98 ± 10% (n = 37), for hay samples fortified at 0.01 to 300 mg/kg were 91 ± 17% (n = 28) and for seed samples fortified at 0.01 to 15 mg/kg were 91 ± 10% (n = 11).

Table 25 Residues for chlorantraniliprole in alfalfa from trials with an SC formulation (21740)

Location (year) variety	Plot/ cutting	Number	g ai/ha	g ai/h L	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Moisture
Germansville, PA, USA (2007) Ameristand	1/1st	1	113	48	243	Early bloom	Forage Hay	0 0	8.3 22	76% 32%
	1/2nd	1	118	46	258	Early bloom	Forage Hay	0 0	7.6 29	70% 28%
Mineral, VA, USA (2007)	1/1st	1	110	53	207	BBCH 61	Forage Hay	0 0	3.2 23	76% 11%
	1/2nd	1	110	53	207	BBCH 61 BBCH 63 BBCH 63	Forage Hay	0 7 14 0 7 14	6.9 7.1 7.9 20 18 14	76% 17%
Richland, IA, USA (2007) Pioneer 54H91	1/1st	1	114	81	141	10% bloom	Forage Hay	0 0	5.7 27	79% 22%
	1/2nd	1	111	80	139	10% bloom	Forage Hay	0 0	5.9 22	77% 16%

Location (year) variety	Plot/ cutting	Number	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Moisture
Richland, IA, USA (2007)	1/1st	1	112	76	147	10% bloom	Forage Hay	0 0	6.2 19	79% 28%
	1/2nd	1	112	81	138	5% bloom	Forage Hay	0 0	7.6 25	77% 21%
York, NE, USA (2007)	1/1st	1	110	58	190	BBCH 61	Forage Hay	0 0	4.8 15	75% 22%
Multi Queen	1/2nd	1	111	60	185	BBCH 61	Forage Hay	0 0	5.2 15	78% 33%
	2/1	1	112	59	189	BBCH 85	seed	0	1.7	14%
Starbuck, MB, CAN (2007)	1/1st	1	109	107	102	10% bloom	Forage Hay	0 0	5.7 32	82% 16%
EXP-AR-18	1/2nd	1	115	110	105	10% bloom	Forage Hay	0 0	11 29	74% 41%
	2/1	1	115	110	105	mature	Seed	0	0.46	16%
Starbuck, MB, CAN (2007)	1/1st	1	112	110	102	10% bloom	Forage Hay	0 0	6.9 46	84% 18%
Magnum 3	1/2nd	1	115	112	103	10% bloom	Forage Hay	0 0	6.3 39	76% 32%
	2/1	1	112	112	100	mature	Seed	0	0.26	10%
Guernsey, SK, CAN (2007)	1/1st	1	112	56	200	10% bloom	Forage Hay	0 0	5.4 20	78% 13%
La Rocca del Pallidia	1/2nd	1	114	57	200	10% bloom	Forage Hay	0 0	7.5 18	79% 34%
	2/1	1	112	65	200	BBCH 89	Seed	0	0.45	10%
Jerome, ID, USA (2007)	1/1st	1	112	63	178	10% bloom	Forage Hay	0 0	4.6 15	77% 13%
R43M708	1/2nd	1	111	62	180	10% bloom	Forage Hay	0 0	3.7 18	77% 28%
	2/1	1	113	59	193	BBCH 89	Seed	0	0.11	6%
Fresno, CA, USA (2007)	1/1st	1	111	79	140	BBCH 61	Forage Hay	0 0	4.1 11	71% 17%
American	1/2nd	1	112	80	140	BBCH 61	Forage Hay	0 0	3.0 12	69% 11%
	2/1	1	116	81	144	BBCH 90	Seed	0	0.73	8%
Ephrata, WA, USA (2007) 640	1/1st	1	111	63	177	10% bloom	Forage Hay	0 0	3.0 9.9	84% 26%
	1/2nd	1	111	63	176	10% bloom	Forage Hay	0 0	2.0 8.6	82% 10%
	2/1	1	113	63	179	BBCH 87	Seed	0	0.32	9%
Wakaw, SK, CAN (2007)	1/1st	1	110	55	200	10% bloom	Forage Hay	0 0	6.7 23	80% 16%
Rambler	1/2nd	1	110	55	200	10% bloom	Forage Hay	0 0	6.8 19	71% 18%
	2/1	1	112	56	200	BBCH 89	Seed	0	0.87	11%
Rosthern, SK, CAN (2007)	1/1st	1	113	57	200	10% bloom	Forage Hay	0 0	5.3 23	83% 16%
Farm Pure Seeds	1/2nd	1	111	56	200	10% bloom	Forage Hay	0 0	6.2 18	79% 28%
Pilger, SK, CAN (2007)	1/1st	1	108	54	200	10% bloom	Forage Hay	0 0	5.9 27	75% 14%
	1/2nd	1	110	55	200	10–20% bloom	Forage Hay	0 0	7.8 28	73% 28%
	2/1	1	104	57	200	BBCH 88	Seed	0	0.49	20%

Location (year) variety	Plot/ cutting	Number	g ai/ha	g ai/hL	L/ha	Application GS	Sample GS	PHI (days)	Residue (mg/kg)	Moisture
Myrnam, AB, CAN (2007) 201+2	1/1st	1	109	99	110	5–10% bloom	Forage Hay	0 0	2.1 11	78% 51%
	1/2nd	1	116	58	200	10% bloom	Forage Hay	0 0	5.7 15	75% 46%
	2/1	1	113	103	110	BBCH 89	Seed	0	1.5	14%

Straw, fodder and forage of cereal grains and grass

Table 26 Residues for chlorantraniliprole in corn fodder (stover)

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Richland, IA, USA (2007) 33H26	SC	2 (7)	110 112	42 67	264 166	BBCH 60 BBCH 60	13	1.7	21741
Gardner, ND, USA (2007) 9454349	SC	2 (7)	116 112	75 75	155 150	BBCH 85 BBCH 89	15	2.2	21741
York, NE, USA (2007) 34A17	SC	2 (7)	111 112	60 60	186 187	BBCH 85 BBCH 87	14	3.1	21741
Branchton, ON, CAN (2007) 38P03	SC	2 (7)	111 112	28 28	400 400	BBCH 77-83 BBCH 80-83	14	3.1	21741
Branchton, ON, CAN (2007) 38N87	SC	2 (7)	110 108	28 27	400 400	BBCH 77-83 BBCH 80-83	14	2.8	21741
St. George, ON, CAN (2007) 38N87	SC	2 (7)	105 111	26 28	400 400	BBCH 77-83 BBCH 80-83	14	3.7	21741
Hinton, OK, USA (2007) DKC50-20	SC	2 (7)	110 108	49 48	225 227	BBCH 85-87 BBCH 87	15	3.8	21741
Maricopa, AZ (2007) Mexican June	SC	4 (1,35,14)	113 110 112 116		374 364 402 355	Mature with milk stage kernels Fruiting Brown dead Brown dead	14	0.26	IR-4 09732
Citra, FL (2007) 31Y42 Field	SC	4 (2,6,8)	121 112 115 116		308 280 290 290	Milk stage Milk stage Past milk stage Corn hardening	14	0.69	IR-4 09732
Salisbury, MD (2007) 8921YG1/RR Field	SC	4 (1,27,7)	116 111 111 113		262 262 262 262	Milk stage Milk stage Drying down Ears beginning to droop over	14	12	IR-4 09732
Holt, MI (2007) Garst 8921YG1/RR	SC	4 (1,21,7)	121 121 118 118		206 196 196 196	Milk stage Milk stage Mature field corn Mature corn	13	5.4	IR-4 09732
Fargo, ND (2007) PFS 24A78RR	SC	4 (1,36,7)	112 112 112 112		168 168 168 168	Milk stage Milk stage 50% senesced 80% senesced	14	3.64	IR-4 09732
Bridgeton, NJ (2007) 8487YG1/GT	SC	4 (1,21,8)	122 122 121 115		327 355 364 327	Fruiting Fruiting Fruiting Fruiting	14	3.96	IR-4 09732

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Freeville, NY (2007) Kind Field	SC	5 (12,2,35,8)	113 113 113 113 113		467 467 467 467 467	14–16 leaves 16 leaves 16 leaves 16 leaves 15-16 leaves	14	0.82	IR-4 09732
Aurora, OR (2007) Hybrid #296 Field	SC	4 (1,5,8)	113 112 112 115		449 439 449 458	Kernels at milk stage Milk stage Milk stage Dent stage	14	2.09	IR-4 09732
Prosser, WA (2007) Stealth 6497	SC	4 (1,47,7)	114 112 113 112		252 252 243 243	Fruiting Vegetative Brown leaves Brown leaves	14	2.08	IR-4 09732
Arlington, WI (2007) Renk RK488 Field	SC	4 (1,5,8)	121 122 113 112		299 308 290 290	Tasselling Milking Seeding Mature	13	5.32	IR-4 09732
Taber, AB (2007) Canada Canamaize Field	SC	4 (2,13,7)	111 114 115 113		196 206 206 206	BBCH 83-85 BBCH 87-89 Seeding Mature	15	2.36	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	4 (1,41,8)	116 110 115 115		561 551 551 551	Cobs at milk stage Cobs at milk stage Mature Mature	14	7.69	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	4 (1,41,8)	111 116 111 114		561 551 551 551	Cobs at milk stage Cobs at milk stage Mature, leaves 50% green Mature, leaves 30% green	14	4.52	IR-4 09732
Branchton, ON (2007) Canada 38P03 Field	SC	4 (1,34,7)	106 113 111 110		336 364 355 346	Milking Milking BBCH 77-83 BBCH 80-83	14	7.10	IR-4 09732

Table 27 Residues for chlorantraniliprole in corn forage from Canada and USA trials

Location (year) variety	FL	No (interval)	g ai/ha		L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Richland, IA, USA (2007) 33H26	SC	2 (7)	110 112	42 67	264 166	BBCH 60 BBCH 60	1	0.77	21741
Gardner, ND, USA (2007) 9454349	SC	2 (7)	116 112	75 75	155 150	BBCH 85 BBCH 89	1	1.3	21741
York, NE, USA (2007) 34A17	SC	2 (7)	111 112	60 60	186 187	BBCH 85 BBCH 87	1	1.5	21741
Hinton, OK, USA (2007) DKC50-20	SC	2 (7)	110 108	49 48	225 227	BBCH 85-87 BBCH 87	1	3.0	21741
Maricopa, AZ (2007) Mexican June	SC	2 (1)	113 110		374 364	Mature with milk stage kernels Fruiting	1	5.67	IR-4 09732
Citra, FL (2007) 31Y42 Field	SC	2 (2)	121 112		308 280	Milk stage Milk stage	1	0.30	IR-4 09732

Location (year) variety	FL	No (interval)	g ai/ha		L/ha	Application GS	PHI (days)	Residue (mg/kg)	Reference
Salisbury, MD (2007) 8921YG1/RR Field	SC	2 (1)	116 111		262 262	Milk stage Milk stage	1	2.90	IR-4 09732
Holt, MI (2007) Garst 8921YG1/RR	SC	2 (1)	121 121		206 196	Milk stage Milk stage	1	2.07	IR-4 09732
Fargo, ND (2007) PFS 24A78RR	SC	2 (1)	112 112		168 168	Milk stage Milk stage	1	4.95	IR-4 09732
Bridgeton, NJ (2007) 8487YG1/GT	SC	2 (1)	122 122		327 355	Fruiting Fruiting	1	1.99	IR-4 09732
Freeville, NY (2007) Kind Field	SC	3 (12,2)	113 113 113		467 467 467	14–16 leaves 16 leaves 16 leaves	1	1.05	IR-4 09732
Aurora, OR (2007) Hybrid #296 Field	SC	2 (1)	113 112		449 439	Kernels at milk stage Milk stage	1	1.86	IR-4 09732
Prosser, WA (2007) Stealth 6497	SC	2 (1)	114 112		252 252	Fruiting Vegetative	1	5.14	IR-4 09732
Arlington, WI (2007) Renk RK488 Field	SC	2 (1)	121 122		299 308	Tasselling Milking	1	2.76	IR-4 09732
Taber, AB (2007) Canada Canamaize Field	SC	2 (2)	111 114		196 206	BBCH 83-85 BBCH 87-89	1	3.72	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	2 (1)	116 110		561 551	Cobs at milk stage Cobs at milk stage	1	2.40	IR-4 09732
Dehli, ON (2007) Canada Pioneer 39D82 Field	SC	2 (1)	111 116		561 551	Cobs at milk stage Cobs at milk stage	1	2.68	IR-4 09732
Branchton, ON (2007) Canada 38P03 Field	SC	2 (1)	106 113		336 364	Milking Milking	1	2.36	IR-4 09732

Forage = whole plant, K+CWHR = kernels and cob with husk removed

Forage and K+CWHR collected PHI after 2nd spray for all trials except Freeville NY where it was after the 3rd spray.

Table 28 Residues for chlorantraniliprole in corn forage from EU trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Antequera, Andalucia, Spain (2006) Zaragoza	SC	2 (50)	31.10 31.31	6.2 6.2	502 505	BBCH 55-57 BBCH 81	W plant	7	0.24	20120
Douai, Nord Pas De Calais, France (2006) Cosmos	SC	2 (86)	31.31 30.26	12 12	252 244	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	< 0.01 0.60 0.58 0.09 0.21	20120
Corteolona, Lombardia, Italy (2006) Eleonora	SC	2 (40)	31.72 31.72	6.2 6.2	514 511	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.12 0.36 0.33 0.35 0.31	20120
Saint Trivier sur Moignans, Rhône-Alpes, France (2006) DK 5011	SC	2 (50)	30.68 31.31	6.2 6.2	496 506	BBCH 55 BBCH 83-85	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.23 0.55 1.1 0.93 0.27	20120
Rozbity Kamień, PL 09-180, Central Poland, Poland (2006) Delito	SC	2 (56)	31.93 30.89	6.2 6.2	514 499	BBCH 55-59 BBCH 84	W plant	7	0.29	20120
Nea malgara, Thessaloniki, Greece (2006) Z98	SC	2 (39)	32.32 31.34	6.2 6.2	522 506	BBCH 55 BBCH 84-85	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.53 0.79 0.047 0.47 0.56	20120
Goch-Nierswalde, North Rhine Westphalia, Germany (2006) Gavott	SC	2 (52)	29.58 31.30	6.2 6.2	478 506	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.073 0.44 1.0 1.3 0.77	20120
Kápolnásnyek, County Fejér, Hungary (2006) DK 440	SC	2 (15)	32.04 30.58	6.2 6.2	519 496	BBCH 55 BBCH 82	W plant	7	0.55	20120
Térmens, Lleida, Spain (2006) DKC 6575	SC	2 (47)	32.35 30.47	6.2 6.2	521 492	BBCH 55 BBCH 73	W plant	7	0.66	20120
Motterwitz, Saxony, Germany (2006) Monumental	SC	2 (43)	32.30 29.80	6.2 6.2	520 480	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.034 0.59 0.35 0.36 0.35	20120
Charnay-lès-Macon, Bourgogne, France (2007) Panama	SC	2 (50)	31.46 30.24	6.2 6.2	509 489	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.076 0.55 0.45 0.69 0.35	21629
Graffignana, Lombardia, Italy (2007) Kubric	SC	2 (35)	31.46 30.24	6.2 6.2	506 486	BBCH 55-59 BBCH 83	W plant	7	1.7	21629
	WG	2 (35)	30.77 31.47	6.2 6.2	500 507	BBCH 55-59 BBCH 83	W plant	7	1.6	

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Application GS	Sample	PHI (days)	Residue (mg/kg)	Reference
Saint Martin le Châtel, Rhône-Alpes, France (2007) Lemoro	SC	2 (48)	31.66 30.85	6.2 6.2	510 497	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.15 0.99 0.58 1.0 0.55	21629
Altreetz, Brandenburg, Germany (2007) DKC 2960	SC	2 (44)	32.40 31.16	6.2 6.2	522 502	BBCH 55 BBCH 83	W plant	7	0.34	21629
	WG	2 (44)	32.34 31.93	6.2 6.2	520 513	BBCH 55 BBCH 83	W plant	7	0.55	
Imathia, Central Macedonia, Greece (2007) Z-98	SC	2 (39)	31.01 30.79	6.2 6.2	498 495	BBCH 55 BBCH 83	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.17 0.27 0.11 0.066 0.33	21629
Goch-Nierswalde, North Rhine Westphalia, Germany (2007) Darlin	SC	2 (74)	31.61 30.36	6.2 6.2	509 489	BBCH 55 BBCH 81	W plant W plant W plant W plant W plant	–0 +0 3 7 14	0.51 2.5 1.7 0.99 1.2	21629
Kápolnásnyék, Fejér County, Hungary (2007) DK 440	SC	2 (24)	31.70 32.04	7.8 7.8	409 413	BBCH 55 BBCH 72	W plant	7	0.92	21629
	WG	2 (24)	31.43 31.43	7.8 7.8	404 404	BBCH 55 BBCH 72	W plant	7	1.6	
Térmens, Catalunya, Spain (2007) DKC5784YG	SC	2 (47)	30.45 31.46	6.2 6.2	490 504	BBCH 55 BBCH 83	W plant	7	0.74	21629
	WG	2 (47)	30.42 30.77	6.2 6.2	491 500	BBCH 55 BBCH 83	W plant	7	0.69	

W plant = whole plant

Almond hulls

Almond hulls and nuts with shells were separated in the field and placed in separate composite piles. Hull samples were collected prior to the nutmeat samples. Hull samples were taken from the composite hull pile and placed in residue bags. In general, almond nuts and shells were then separated by hand; using disposable gloves; pecan nuts and shells were separated using commercially available crackers.

Table 29 Residues for chlorantraniliprole in almond hulls from USA trials reported by the 2008 JMPR

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Kerman, CA, USA (2006) Nonpareil	WG	2 (7)	112 111	12 12	935 926	Initial drying Drying	Maturity	10	0.88	18803
Madera, CA, USA (2006) Nonpareil	WG	2 (7)	114 113	12 12	935 935	Drying Drying	Maturity	10	0.38	18803
Glenn, CA, USA (2006) Nonpareil	WG	2 (7)	112 112	12 12	935 935	Hull split	Maturity	10	0.59	18803
Terra Bella, CA, USA (2006) Pareil	WG	2 (7)	111 112	12 12	935 945	88 88	89	11	0.52	18803

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	GS	Sample GS	PHI (days)	Residue (mg/kg)	Reference
Sanger, CA, USA (2006) Neplus	WG	2 (7)	112 112	12 12	945 935	85 85	89	10	1.6	18803
Sultana, CA, USA (2006) Carmel	WG	2 (7)	112 112	12 12	945 945	85 87	89	10	1.1	18803

Kerman, CA 22% moisture; Madera, CA 24%; Glenn, CA 23%; Terra Bella, CA 82%; Sanger, CA 24%; Sultana, CA 22%.

Fate of residues in storage and processing

Residues after Processing

Processing studies are necessary according to the uses and the residues of chlorantraniliprole on raw agricultural commodities. The fate of chlorantraniliprole residues during processing of raw agricultural commodities was investigated in several major registered crops (oranges, cabbage and mint) using important processing procedures.

As a measure for the transfer of residues into processed products, a processing factor was used, which is defined as:

$$PF = \frac{\text{Residue in processed product (mg/kg)}}{\text{Residue in raw agricultural commodity (mg/kg)}}$$

A concentration of residues takes place when TF > 1.

Oranges

Samples of juice were prepared using a juice extractor and the resulting juice sieved before transferring to plastic bottles and freezing.

Table 30 Residues of chlorantraniliprole in citrus from Brazil trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	PHI (days)	Residue (mg/kg) Fruit	Juice	TF	Reference
Sitio Laranjal, Limiera SP, Brazil (2008) Bahia		4 (10, 22,21)	0.02[a] 60 60 60	– 3 3 3	 2000 2000 2000	0 5 7 10 14	0.08 0.08 0.09 0.07 0.09	0.02 0.03 0.01 0.02 0.01	0.25 0.38 0.11 0.29 0.11	M08043
Mogi Guaçu, Holambro, Brazil (2008) Pera Rio		4 (10, 22,21)	0.02[a] 60 60 60	– 3 3 3	 2000 2000 2000	0 5 7 10 14	0.12 0.15 0.12 0.10 0.13	0.01 0.02 0.03 0.02 0.02	0.08 0.13 0.25 0.20 0.15	M08043
Decsalvado, Holambro, Brazil (2008) Valência Americano		4 (xx,21, 21)	0.02[a] 60 60 60	– 3 3 3	 2000 2000 2000	0 5 7 10 14	0.10 0.13 0.09 0.09 0.07	0.03 0.02 0.01 0.02 0.02	0.30 0.15 0.11 0.22 0.29	M08043

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	PHI (days)	Residue (mg/kg) Fruit	Juice	TF	Reference
Monte Alegre de Minas, Uberlandia, Brazil (2008) Pera Rio		4 (21,21, 22)	0.02[a] 60 60 60	– 3 3 3	 2000 2000 2000	0 5 7 10 14	0.04 0.06 0.06 0.09 0.09	< 0.01 0.01 < 0.01 < 0.01 < 0.01	< 0.25 0.17 < 0.17 < 0.11 < 0.11	M08043

[a] Soil drench rate = 1 g ai/plant × 1 plant/(7 m × 4 m) × 10^4 m^2/ha = 360 g ai/ha for Trials 1–3;

1 g ai./plant × 1 plant/(6 m × 3.5 m) × 10^4 m^2/ha = 475 g ai/ha for Trial 4

NOTE: all trials + 0.25% v/v mineral oil or vegetable oil

Cabbages

Cooked cabbage

Cabbages were weighed and outer leaves removed. The cabbage heads were then cut into big pieces and stalks removed. The pieces were cooked in boiling water for 15 min to produce "cooked cabbage".

Sauerkraut

Cabbages were weighed and outer leaves removed. The cabbage heads were then cut into big pieces and stalks removed. The cabbage was then cut into thin strips using a mandolin and placed into a stainless steel bowl. Salt and lactic acid bacteria were added and mixed with the cabbage until homogeneously distributed. The mixture was covered with a plastic sheet and weighed down by placing a bag full of brine on top. Fermentation was for 4 weeks at 20 °C. After straining (sauerkraut juice), the sauerkraut was packaged into glass jars and pasteurised (1 min at 85 °C) and the jars cooled (sauerkraut).

Table 31 Residues for chlorantraniliprole in cabbage trials from Europe

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Sample GS	PHI (days)	Residue (mg/kg)	TF	Reference
Poncey-les-Atheè, Bourgogne, France (2007) Zerlina	WG	2 (8)	36.7 35.7	4.4 4.4	836 812	Heads Cooked Sauerkraut Sauerkraut juice	1	0.018 < 0.01 < 0.01 < 0.01	– < 0.56 < 0.56 < 0.56	21628
Tortona, Piemonte, Italy (2007) Crauto	WG	2 (6)	35.0 34.6	4.4 4.4	800 791	Heads Cooked Sauerkraut Sauerkraut juice	1	< 0.01 < 0.01 < 0.01 < 0.01	– < 1 < 1 < 1	21628
Ortwig, Brandenburg, Germany (2007) Cassandra	WG	2 (7)	34.5 36.1	4.4 4.4	787 825	Heads Cooked Sauerkraut Sauerkraut juice	1	0.04 < 0.01 < 0.01 < 0.01	– < 0.25 < 0.25 < 0.25	21628
Lleida, Catalunya, Spain (2007) Beltis	WG	2 (7)	35.3 35.0	4.4 4.4	804 802	Heads Cooked Sauerkraut Sauerkraut juice	1	0.059 < 0.01 < 0.01 < 0.01	– < 0.17 < 0.17 < 0.17	21628

Mint

Mint oil was extracted from mint hay samples by steam distillation. Mint hay samples were packed into distillation tubs and steamed at 35–43 °C under low pressure (0.5–4 psi) until all oil was extracted, condensed and collected.

Table 32 Residues for chlorantraniliprole in mint from US trials

Location (year) variety	FL	No (interval)	g ai/ha	g ai/hL	L/ha	Sample GS	PHI (days)	Residue (mg/kg)	TF	Reference
Portage, WI, USA (2006) Black Mitchem	W G	2 (15)	112 109		742 720	Tops Oil	3	4.61 < 0.01	– < 0.002	IR-4 09342
Moxee, WA, USA (2006) Native Spearmint	W G	2 (14)	114 114		738 744	Tops Oil	3	5.68 < 0.01	– < 0.002	IR-4 09342

APPRAISAL

Chlorantraniliprole is a novel insecticide belonging to the class of selective ryanodine receptor agonists and was evaluated for the first time by JMPR in 2008 for toxicology and residues. The compound was listed for additional residue assessment by 2010 JMPR at the Forty-first Session of the CCPR.

The Meeting received information on chlorantraniliprole methods of residue analysis, national registered use patterns, supervised residue trials and fate of residues in processing.

The 2008 JMPR established an ADI and ARfD for chlorantraniliprole of 0–2 mg/kg bw/day and "not required" respectively.

Methods of analysis

A range of analytical methods have been reported for the analysis of chlorantraniliprole in plant and animal commodities. The basic approach employs extraction by homogenisation with acetonitrile:water, and column clean-up using solid phase extraction (hydrophilic-lipophilic balanced polymeric (HLB) and strong anion exchange (SAX) in sequence). Residues are determined by gas chromatography with an electron capture detector or liquid chromatography with mass spectrometric detection. The methods for chlorantraniliprole have been extensively validated with numerous recoveries on a wide range of substrates with LOQs of 0.01 mg/kg.

Results of supervised trials on crops

Supervised trials were available for the use of chlorantraniliprole on numerous crops: citrus (oranges, mandarins and tangelos), blackberries, raspberries, strawberries, Brassica vegetables (broccoli, cabbage and cauliflower), legume vegetables, sweet corn, maize, root and tuber vegetables (Japanese radish and turnips), soya beans, sugarcane, alfalfa and mint.

Residue trial data was made available from Brazil, Canada, member states of the European Union, Japan, The Philippines and the USA. Additionally for some crops residue trial data reported by the 2008 JMPR from Australia, New Zealand and member states of the European Union were not evaluated at that time as GAP was not available. These data are re-evaluated here where new GAP information has become available and the data would lead to a revised maximum residue level recommendation.

The NAFTA calculator was used as a tool in the estimation of the maximum residue level from the selected residue data set obtained from trials conducted according to GAP. As a first step,

the Meeting reviewed all relevant factors related to each data set in arriving at a best estimate of the maximum residue level using expert judgement. Then, the NAFTA calculator was employed. If the statistical spreadsheet suggested a different value from that recommended by the JMPR, a brief explanation of the deviation was provided. Some common factors that may lead to rejection of the statistical estimate include those situations where the number of data points is less than 15 or where there are too many values below LOQ.

Additionally the Meeting has utilised a new tool that can provide additional useful information for estimating maximum residue levels. The tool is based on a compilation of residues in various crops following a single spray application where the data were normalised to an application rate of 1 kg ai/ha or 1 kg ai/hL (General Consideration Item 2.8). Estimates of high residues can be made for certain pesticides by combining the database of normalised day 0 residues with simple equations for decline. Chlorantraniliprole is a suitable candidate for using the approach to inform expert judgement.

Citrus fruits

Data for citrus with corresponding GAP information were available from supervised trials conducted in Brazil and the Republic of South Africa.

In Brazil chlorantraniliprole is permitted to be used on citrus with a maximum of one soil application at the equivalent of 240 g ai/ha and two foliar sprays at a spray concentration of 3 g ai/hL and a PHI of 5 days. Residues of chlorantraniliprole in citrus from four trials in Brazil approximating GAP were: 0.09, 0.09, 0.13 and 0.15 mg/kg.

In South Africa chlorantraniliprole is permitted to be used on citrus with a maximum of two foliar sprays at a spray concentration of 3.5 g ai/hL and a PHI of 7 days. Eight trials complied with GAP of South Africa with residues in whole fruit of 0.14, 0.15, 0.18, 0.22, 0.22, 0.25, 0.27 and 0.35 mg/kg. Residues in the edible portion (flesh) were 0.05, 0.05, 0.06, 0.07, 0.07, 0.08, 0.09 and 0.11 mg/kg. In peel residues were: 0.44, 0.49, 0.58, 0.62, 0.74, 0.78, 0.81 and 1.1 mg/kg.

The Meeting noted that the use patterns for citrus in Brazil and the Republic of South Africa were different and decided to use the data from South Africa for the purposes of estimating a maximum residue level and STMR and to make a recommendation for citrus fruit.

Residues in whole fruit in ranked order (n = 8) were: 0.14, 0.15, 0.18, 0.22, 0.22, 0.25, 0.27 and 0.35 mg/kg. The median residue in the edible portion was 0.07 mg/kg.

The Meeting estimated a maximum residue level for whole fruit and an STMR for the edible portion for chlorantraniliprole in citrus of 0.5 and 0.07 mg/kg respectively. Use of the NAFTA calculator yielded a value of 0.44 mg/kg while a day 0 decline model[2] yielded 0.35 mg/kg.

Berries and other small fruits

Data were available from supervised trials on raspberries and blackberries (dewberries) in Canada and the USA and strawberries in Japan.

The GAPs of Canada and the USA are similar and the GAP of the USA was used to evaluate trials on raspberries and blackberries from the two countries (USA GAP: 110 g ai/ha, PHI 3 days with a maximum seasonal application of 225 g ai/ha).

Residues of chlorantraniliprole in berries from eight trials in Canada and the USA complying with GAP of the USA were: 0.049, 0.091, 0.095, 0.235, 0.436, 0.481, 0.482 and 0.513 mg/kg.

Residues of chlorantraniliprole in strawberries from two trials in Japan complying with GAP (2.5 g ai/100L and PHI 1 day) were 0.23 and 0.30 mg/kg.

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[2] Maclachlan DJ, Hamilton D. 2010 A new tool for the evaluation of crop residue trial data (day zero-plus decline). Food Additives & Contaminants: Part A,, 27:347–364

The Meeting noted that there are registrations for chlorantraniliprole in caneberries, cranberries, strawberries and grapes and that as these commodities constitute the majority of members of the commodity group berries and small fruit, it would be preferable to estimate a group maximum residue level. Using 17 trials matching GAP of the USA, the 2008 JMPR estimated a maximum residue level of 1 mg/kg for grapes and an STMR and HR of 0.119 and 0.52 mg/kg respectively. The Meeting agreed to recommend a group maximum residue level for berries and other small fruit of 1 mg/kg based on the trials in grapes and an STMR of 0.336 mg/kg based on trials on raspberries and blackberries. The recommendation for the commodity group berries and other small fruit replaces the previous recommendation of 1 mg/kg for grapes.

Brassica vegetables

New data were available from supervised trials on brassica vegetables conducted in Europe. Additionally new GAP has become available from Australia allowing residue trials reported by the 2008 JMPR to be evaluated against that countries GAP.

Residues in trials from Australian and New Zealand complying with the GAP of Australia (40 g ai/ha and PHI 7 days) were: broccoli 0.07, 0.12, 0.22 and 0.27 mg/kg; cauliflower 0.23 mg/kg; cabbage < 0.01, 0.08, 0.13, 0.17 and 0.20 mg/kg and Brussels sprouts 0.20 and 0.28 mg/kg.

In trials from Europe on brassica vegetables complying with the GAP of Spain (35 g ai/ha and PHI 1 day) residues were: cabbage < 0.01 (10), 0.095, 0.011, 0.012, 0.012, 0.015, 0.018, 0.04, 0.059 and 0.10 mg/kg.

Residues on broccoli were 0.064, 0.10, 0.10, 0.12, 0.14, 0.19 and 0.37 mg/kg, and on cauliflower residues were < 0.01, < 0.01, 0.012, 0.019, 0.036, 0.047 and 0.082 mg/kg.

Chlorantraniliprole is registered in the Canada for use on Brassica vegetables at 100 g ai/ha, PHI of 3 days and a maximum application per season of 2 g ai/ha. Trials were available from Canada and the USA (reported by the 2008 JMPR) in which crops were treated twice at three day intervals at 112 g ai/ha with harvest 3 days after the last spray. Residues on broccoli (n = 9) complying with the revised Canada GAP were: 0.12, 0.30, 0.32, 0.32, 0.35, 0.38, 0.40, 0.41 and 0.56 mg/kg.

Residues on cabbage (n = 10) complying with Canada GAP were: 0.033, 0.066, 0.10, 0.28, 0.29, 0.48, 0.51, 0.64, 0.75 and 1.1 mg/kg.

The Meeting noted that the registered use of chlorantraniliprole in Canada is for Brassica vegetables and decided to recommend a group MRL. Residues were highest in the cabbages and this dataset was used for the purposes of estimating a maximum residue level for the group. The Meeting estimated a maximum residue level and an STMR value for chlorantraniliprole in Brassica vegetables of 2 and 0.385 mg/kg, respectively. Use of the NAFTA calculator yielded a value of 2.45 mg/kg as an estimate of high residues while use of the day 0 plus decline approach[3] (median DT_{50} of 7 days) yielded 2.0 mg/kg.

Sweet corn

Chlorantraniliprole is registered in the US on sweet corn at 73 g ai/ha with a maximum seasonal rate of 225 g ai/ha and a PHI of 1 day. The minimum retreatment interval is 1 day.

Residues on sweet corn in 14 trials conducted in Canada and the USA at an exaggerated application rate (4 × 112 g ai/ha) were all < 0.01 (14) mg/kg. Although the intervals between the sprays were longer than the minimum specified on the approved USA labels, the Meeting considered the data to adequately reflect the residues in kernels and cobs with husk removed.

Trials were also available from Europe that approximated the GAP of Hungary (30 g ai/ha, last application at BBCH 87 and PHI determined by last application growth stage). Residues in 10 trials approximating GAP of Hungary were < 0.01 (10) mg/kg for kernels and cobs with husks removed.

[3] ibid.

The Meeting estimated maximum residue levels and STMR values for chlorantraniliprole in sweet corn (corn-on-the-cob) of 0.01* and 0.01 mg/kg respectively.

Legume vegetables

Residues trials conducted on green beans were made available from European countries however, chlorantraniliprole does not have a registered use on green beans in this region and the trials are not evaluated further.

Residues in two trials from Japan on green soya beans (seed + pod) and complying with the GAP of that country (1.25 g ai/100 L and PHI 3 days) were 0.15 and 0.32 mg/kg.

In a single trial from the Philippines on pole beans matching the GAP of that country (37.5 g ai/ha and PHI 1 day) residues were 0.145 mg/kg.

The Meeting decided the number of trials was inadequate to estimate a maximum residue level for the legume vegetables pole beans and immature soya beans.

Soya beans (dry)

Trials on soya beans were reported from Brazil (GAP: 2 × 10 g ai/ha, at 14 day intervals and PHI of 21 days).

Chlorantraniliprole residues in soya bean grain from four trials from Brazil matching GAP in rank order (median underlined) were: 0.10, 0.11, 0.11 and 0.12 mg/kg.

Two trials were available from Japan complying with GAP (3 × 1.25 g ai/hL, at 7 day intervals and PHI of 7 days) from that country had residues in grain of < 0.01 and 0.03 mg/kg.

The Meeting decided that the number of trials available was not adequate to enable a recommendation of a maximum residue level for soya beans (dry).

Root and tuber vegetables

Trials on Japanese radish and turnips were reported from Japan however no GAP was available and the data were not evaluated further.

Maize

Trials on maize were reported from the USA (GAP: 73 g ai/ha, PHI of 14 days and a maximum application per season of 225 g ai/ha).

Chlorantraniliprole residues in twenty one trials from the USA approximating GAP in ranked order were: < 0.01 (20) and 0.013 mg/kg.

The Meeting noted that the residues in maize are adequately covered by the existing recommendation of the 2008 Meeting for cereal grains of 0.02 mg/kg.

Sugar cane

Trials on sugar cane were reported from Brazil (GAP: one soil application at 158 g ai/ha and one foliar application at 21 g ai/ha and PHI of 60 days).

Chlorantraniliprole residues in four trials from Brazil matching GAP in rank order were: 0.09, 0.13, 0.16 and 0.16 mg/kg.

No data were available on processing of cane into sugar products, e.g., molasses, bagasse or refined sugar.

The Meeting estimated a maximum residue level and an STMR value for chlorantraniliprole in sugar cane of 0.5 and 0.145 mg/kg, respectively.

Tree nuts

Trials were available to the 2008 JMPR from the USA on residues of chlorantraniliprole in almonds and pecans but could not be evaluated as no relevant GAP existed at the time of evaluation. GAP has since then become available.

Chlorantraniliprole residues in six trials on almonds from the USA approximating GAP (application at 110 g ai/ha, seasonal maximum 220 g ai/ha, interval 7 days and PHI 10 days) were < 0.01 (6) mg/kg.

Chlorantraniliprole residues in six trials on pecans from the USA approximating GAP (4 × 110 g ai/ha, interval 7 days and PHI 10 days) in rank order were: < 0.01 (4), 0.014 and 0.015 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for chlorantraniliprole in tree nuts of 0.02 and 0.01 mg/kg respectively.

Mint

Chlorantraniliprole field trials on mint were made available to the Meeting from the USA (GAP: 73 g ai/ha, PHI of 3 days and a maximum application per season of 225 g ai/ha).

Chlorantraniliprole residues on mint were 2.2, 4.6, 4.6, 5.3 and 5.7 mg/kg (fresh weight basis). The Meeting estimated maximum residue level and STMR values for chlorantraniliprole in mint tops of 15 and 4.6 mg/kg (fresh weight basis). The NAFTA calculator suggested a high residue of 9.0 mg/kg (mean + 3sd).

Animal feedstuffs

Alfalfa

Chlorantraniliprole field trials on alfalfa were made available to the Meeting from the USA (GAP: 73 g ai/ha, one application/cutting, PHI of 0 days and a maximum application per season of 224 g ai/ha).

Trials were available where alfalfa was treated at 1.5 × the maximum rate. The present Meeting considered the proportionality of residue data with application rates and decided that proportionality could be used in certain circumstances in the estimation of maximum residue levels (General Consideration Item 2.6). Considering the evidence that residues scale with application rate for foliar sprays, the Meeting decided to use alfalfa as an initial example and to make use scaling in estimating maximum residue levels and levels for use in estimation of farm animal dietary burdens. Chlorantraniliprole residues on alfalfa forage treated at 1.5 × the maximum rate were 2.0, 2.1, 3.0, 3.0, 3.2, 3.7, 4.1, 4.6, 4.8, 5.2, 5.3, 5.4, 5.7, 5.7, 5.7, 5.9, 5.9, 6.2, 6.2, 6.3, 6.7, 6.8, 6.9, 6.9, 7.5, 7.6, 7.6, 7.8, 8.3 and 11 mg/kg (fresh weight basis). When corrected for reported moisture contents the residues were 9.5, 9.7, 11, 13, 14, 16, 19, 19, 20, 23, 23, 23, 24, 24, 25, 26, 26, 27, 29, 29, 30, 30, 31, 32, 33, 34, 34, 36, 42 and 43 mg/kg (dry weight basis). The residues scaled to the same application rate as GAP were calculated by dividing by 1.5 and are (n = 30): 6.3, 6.5, 7.3, 8.7, 9.3, 10.7, 12.7, 12.7, 13.3, 15.3, 15.3, 15.3, 16, 16, 16.7, 17.3, 17.3, 18, 19.3, 19.3, 20, 20, 20.7, 21.3, 22, 22.7, 22.7, 24, 28 and 28.7 mg/kg. Using the data scaled for application rate, the Meeting estimated an STMR value for chlorantraniliprole in alfalfa forage of 17 mg/kg (dry weight basis).

Chlorantraniliprole residues on alfalfa hay treated at 1.5 × the maximum rate were: 8.6, 9.9, 11, 11, 12, 15, 15, 15, 15, 18, 18, 18, 19, 19, 20, 20, 22, 22, 23, 23, 23, 25, 27, 27, 28, 29, 29, 32, 39 and 46 mg/kg (fresh weight basis). When corrected for reported moisture contents the residues were 9.6, 13, 13, 13, 17, 19, 22, 22, 23, 23, 24, 25, 25, 26, 26, 26, 27, 27, 27, 28, 31, 32, 32, 35, 38, 39, 40, 49, 56 and 57 mg/kg (dry weight basis). The residues scaled to the same application rate as GAP were calculated by dividing by 1.5 and are (n = 30): 6.4, 8.7, 8.7, 8.7, 11.3, 12.7, 14.7, 14.7, 15.3, 15.3, 16, 16.7, 16.7, 17.3, 17.3, 17.3, 18, 18, 18, 18.7, 20.7, 21.3, 21.3, 23.3, 25.3, 26, 26.7, 32.7, 37.3 and 38 mg/kg.

Using the data scaled for application rate, the Meeting estimated MRL and STMR values for chlorantraniliprole in alfalfa hay of 50 and 17.3 mg/kg (dry weight basis) respectively. Use of the NAFTA calculator yielded a value of 44 mg/kg (95 LnUCL) as an estimate of high residues.

Maize forage and fodder

Chlorantraniliprole field trials on corn forage and fodder were made available to the Meeting from the USA (GAP: 73 g ai/ha, a maximum application per season of 225 g ai/ha, PHI of 14 days for maize and 1 day for sweet corn).

Chlorantraniliprole residues on maize and corn forage (PHI 1 day, including sweet corn) were 0.30, 0.77, 1.0, 1.3, 1.5, 1.9, 2.0, 2.1, 2.4, 2.4, 2.7, 2.8, 2.9, 3.0, 3.7, 5.0, 5.1 and 5.7 mg/kg (fresh weight basis). Chlorantraniliprole residues on maize and corn fodder (PHI 14 days) were 0.26, 0.69, 0.82, 1.7, 2.1, 2.1, 2.2, 2.4, 2.8, 3.1, 3.1, 3.6, 3.7, 3.8, 4.0, 4.5, 5.3, 5.4, 7.1, 7.7 and 12 mg/kg (fresh weight basis).

Residues in trials from the USA were used to recommend STMRs for chlorantraniliprole in maize forage and fodder of 2.4 and 3.1 mg/kg (fresh weight basis) respectively and high residues of 5.7 and 12 mg/kg respectively. The Meeting also estimated a maximum residue level for chlorantraniliprole in maize fodder of 25 mg/kg (dry weight basis and assuming 83% dry matter content). Use of the NAFTA calculator yielded a value of 25.5 mg/kg (99 Ln) as an estimate of high residues.

Almond hulls

Chlorantraniliprole residues in almond hulls from six trials on almonds from the USA GAP (4 × 110 g ai/ha, interval 7 days and PHI 10 days) in rank order were (median underlined): 0.38, 0.52, 0.59, 0.88, 1.1 and 1.6 mg/kg (fresh weight basis). The Meeting estimated an STMR value for chlorantraniliprole in almond hulls of 0.735 mg/kg.

Fate of residues during processing

The fate of chlorantraniliprole residues has been examined in cabbages, oranges and mint processing studies. Estimated processing factors and STMRs are summarised below.

Summary of processing factors for chlorantraniliprole residues

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors	PF (Mean, median or best estimate)	RAC-STMR (mg/kg)	Estimated processed commodity = residue RAC-STMR × PF (mg/kg)
Cabbage	Cooked	< 0.17, < 0.25, < 0.56, < 1	< 0.405	0.35	0.14175
	Sauerkraut	< 0.17, < 0.25, < 0.56, <1	< 0.405		0.14175
Orange	Juice	0.08, < 0.11, < 0.11, 0.11, 0.11, 0.11, 0.13, 0.15, 0.15, < 0.17, 0.17, 0.20, 0.22, < 0.25, 0.25, 0.25, 0.29, 0.29, 0.30, 0.38	0.17	0.22	0.037
Mint	Oil	< 0.002, < 0.002	< 0.002	4.6	0.0092

Chlorantraniliprole did not concentrate in any of the processed commodities studies. As the estimated residues for the processed commodities in the table above are below the maximum residue levels proposed for the raw agricultural commodities, the Meeting decided it was not necessary to make recommendations for maximum residue levels for these processed commodities. The STMR values listed above may be used for the purposes of dietary risk assessment.

Residues in animal commodities

Farm animal dietary burden

The Meeting estimated the dietary burden of chlorantraniliprole in farm animals on the basis of the diets listed in Appendix IX of the FAO Manual 2009 (Maximum proportion of agricultural commodities in animal feed). Calculation from highest residue, STMR (some bulk commodities) and STMR-P values provides the levels in feed suitable for estimating MRLs, while calculation from STMR and STMR-P values for feed is suitable for estimating STMR values for animal commodities. The percentage dry matter is taken as 100% when the highest residue levels and STMRs are already expressed as dry weight.

Estimated maximum and mean dietary burdens of farm animals

Dietary burden calculations for beef cattle, dairy cattle, broilers and laying poultry are provided in Annex 6. The calculations were made according to the animal diets from the USA-Canada (US/CAN), EU and Australia in the Maximum proportion of agricultural commodities in animal feed table (Appendix IX of the FAO Manual 2009).

Animal dietary burden, chlorantraniliprole, ppm of dry matter diet					
		US/CAN	EU	Australia	Japan
Beef cattle	max	8.6	24.4	36.1[a]	3.8
	mean	3.7	13.7	17.2[c]	1.7
Dairy cattle	max	14.2	23.8	28.6[b]	16.6
	mean	6.3	10.5	12.8[d]	7.3
Poultry—broiler	max	0.0117	0.007	0.007	1.4
	mean	0.012	0.007	0.007	0.85
Poultry—layer	max	0.012	1.8[e]	0.007	-
	mean	0.012	0.735[f]	0.007	-

[a] Highest maximum beef or dairy cattle dietary burden suitable for MRL estimates for mammalian meat

[b] Highest maximum dairy cattle dietary burden suitable for MRL estimates for mammalian milk

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

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

[e] Highest maximum poultry dietary burden suitable for MRL estimates for poultry meat and eggs.

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

The chlorantraniliprole dietary burdens for animal commodity MRL and STMR estimation (residue levels in animal feeds expressed on dry weight) are: beef cattle 36.1 and 17.2 ppm, dairy cattle 28.6 and 12.8 ppm, poultry (broilers) 1.8 and 0.85 ppm and poultry (layers) 1.8 and 0.735 ppm.

Animal commodity maximum residue levels

The maximum dietary burden for beef and dairy cattle is 36.1 and 28.6 ppm respectively, so the levels of residues in tissues can be obtained by interpolation between the high residues obtained in tissues and at the 10 and 50 ppm feeding levels. Maximum residues expected in tissues are: fat 0.114 mg/kg, muscle 0.022 mg/kg, liver 0.0989 mg/kg, kidney 0.065 mg/kg and the mean residue for milk 0.013 mg/kg. At the 50 ppm dose level, average residues of chlorantraniliprole were 0.108 mg/kg in cream and 0.027 mg/kg in whole milk. The 2008 JMPR reported that expected residues in cream are 4 × the residues in whole milk or 4 × 0.013 = 0.052 mg/kg. The fat content of cream is 40–60% and the Meeting estimated the mean residue for milk fat to be 2 × the estimated mean cream residue or 2 × 0.052 = 0.104 mg/kg.

The Meeting estimated maximum residue levels for meat (from mammals other than marine mammals) 0.2 mg/kg (fat); edible offal (mammalian) 0.2 mg/kg, milks 0.05 mg/kg and 0.2 mg/kg for milk fat to replace the previous recommendations of 0.01* (fat), 0.01*, 0.01* and 0.1 mg/kg respectively.

The STMR dietary burdens for beef and dairy cattle are 17.2 and 12.8 ppm respectively. Residues in tissues can be obtained by interpolation between the mean residues obtained in tissues at the 10 and 50 ppm feeding levels. The estimated STMRs are: meat (from mammals other than marine mammals) 0.009 mg/kg, fat (from mammals other than marine mammals) 0.049 mg/kg, kidney of cattle, goats, pigs and sheep 0.030 mg/kg, liver of cattle, goats, pigs and sheep 0.047 mg/kg, milks 0.006 mg/kg and milk fat 0.048 mg/kg.

The highest individual tissue residue from the relevant feeding group was used in conjunction with the highest residue dietary burden to calculate the likely highest animal commodity residue level.

Dietary burden (mg/kg)[a] Feeding level [ppm][b]		Chlorantraniliprole residues, mg/kg [c]								
		Milk	Fat		Muscle		Liver		Kidney	
		Mean	High	mean	High	mean	high	mean	High	mean
MRL beef	(36.1) [50, 10] high		(0.114) 0.156		(0.022) 0.029		(0.099) 0.133		(0.065) 0.081	
MRL dairy	(28.6) [50, 10] high	(0.013) 0.022								
STMR beef	(17.2) [50, 10] av			(0.049) 0.14		(0.009) 0.019		(0.047) 0.13		(0.030) 0.068
STMR dairy	(12.8) [50, 10] av	(0.006) 0.022								

[a] Values in parentheses are the estimated dietary burdens

[b] Values in square brackets are the actual feeding levels in the transfer study

[c] Residue values in parentheses in italics are interpolated from the dietary burden, feeding levels in the transfer study and the residues found in the transfer study. High is the highest individual animal tissue residue in the relevant feeding group.

Mean is mean animal tissue (or milk) residue in the relevant feeding group.

The maximum dietary burden for poultry is 1.8 ppm. Maximum residues expected at 23 hours after last feeding are: muscle, skin/fat, liver and eggs are 0.00014, 0.0017, 0.0035 and 0.056 mg/kg.

The Meeting estimated maximum residue levels for poultry meat 0.01* mg/kg (fat); poultry offal 0.01* and eggs 0.1 mg/kg to replace the previous recommendations of 0.01* (fat), 0.01* and 0.01* mg/kg respectively.

The mean dietary burden for poultry is 0.85 ppm for tissues and 0.735 ppm for eggs. STMRs for poultry meat, skin/fat, edible offal and eggs are 0.00007, 0.0008, 0.0016 and 0.023 mg/kg respectively.

RECOMMENDATIONS

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

Definition of the residue (for compliance with MRL and for estimation of dietary intake) for plant and animal commodities: *chlorantraniliprole*

The residue is fat-soluble

CCN	Commodity Name	MRL New	mg/kg Prev	STMR or STMR-P
AL 1020	Alfalfa fodder	50		17.3
FB 0018	Berries and other small fruits	1		0.119
VB 0040	Brassica (cole or cabbage) vegetables, Head cabbages, Flowerhead brassica	2		0.385
FC 0001	Citrus fruits	0.5		0.07
MO 0105	Edible offal (Mammalian)	0.2	0.01*	0.03 K 0.047 L
PE 0112	Eggs	0.1	0.01*	0.052
FB 0269	Grapes	W	1	
AS 0645	Maize fodder	25	-	3.1
MM 0095	Meat (from mammals other than marine animals)	0.2 (fat)	0.01* (fat)	0.050 fat 0.009 muscle
FM 0183	Milk fats	0.2	0.1	0.048
ML 0106	Milks	0.05	0.01*	0.006
HH 0738	Mints	15		4.6
PO 0111	Poultry edible offal of	0.01*	0.01*	0.0016
PM 0110	Poultry meat	0.01* (fat)	0.01* (fat)	0.0008 fat 0.00007 muscle
GS 0659	Sugar cane	0.5		0.145
VO 0447	Sweet corn (corn-on-the-cob)	0.01*		0.01
TN 0085	Tree nuts	0.02		0.01

* the MRL is estimated at or about the LOQ

DIETARY RISK ASSESSMENT

Long-term intake

The evaluation of chlorantraniliprole has resulted in recommendations for MRLs and STMRs for raw and processed commodities. Consumption data were available for 31 food commodities and were used in the dietary intake calculation. The results are shown in Annex 3 of the 2010 Report.

The International Estimated Daily Intakes for the 13 GEMS/Food regional diets, based on estimated STMRs were 0% (0.1–0.4%) of the maximum ADI of 2 mg/kg bw. The Meeting concluded that the long-term intake of residues of chlorantraniliprole from uses that have been considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The 2008 JMPR decided that an ARfD was unnecessary. The Meeting therefore concluded that the short-term intake of chlorantraniliprole residues is unlikely to present a public health concern.

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