IMIDACLOPRID (206)

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EXPLANATION

Imidacloprid, a neonicotinoid insecticide, was first evaluated by the JMPR in 2001 for toxicology. The Meeting derived an ADI of 0.06 mg/kg bw and an ARfD of 0.4 mg/kg bw. The compound was evaluated for residues in 2002, 2006 and 2008. In 2002 the Meeting agreed that the residue definition for compliance with the MRL and for estimation of dietary intake for plant and animal commodities should be the sum of imidacloprid and its metabolites containing the 6-chloropyridinyl moiety, expressed as imidacloprid.

Imidacloprid was scheduled by the Forty-third Session of the CCPR for residue evaluation of additional crops. The Interregional Research Project No. 4 (IR-4) in the USA provided residue data for artichoke, avocado, banana, bean (dry), celery, guava, litchi and papaya to the 2012 JMPR.

RESIDUE ANALYSIS

Analytical methods

Samples of avocado, artichoke, banana, beans (dry), celery, guava, litchi and papaya were fortified with an equimolar combination of imidacloprid and its metabolites desnitro-imidacloprid (WAK 4140, M09), olefin-imidacloprid (WAK 3745, M06), hydroxyl-imidacloprid (WAK 4103, M01) and 6-chloronicotinic acid (6-CNA, M14) and were analysed following conversion to 6-CNA trimethylsilyl ester with 6- N-methyltrimethylsilyl-trifluoroacetamide (MSTFA) by GC-MS using a modification of the Bayer Method 00200-reformated, Report No 102624-R1, 2/23/94 (see JMPR 2002 and 2006). At the LOQ of 0.05 mg/kg (expressed in parent equivalents), the recoveries were for avocado 118±4% (n = 6), artichoke 107 ± 12% (n = 5), banana 87 ± 8% (n = 4), celery 78, 88, 90% (n = 3), guava 76 ± 9% (n = 11), litchi 89 ± 14% (n = 6) and papaya 115 ± 3% (n = 8).

In case of dry beans, the mean recoveries were at the fortification levels of 0.1 mg/kg, 0.2 mg/kg 0.5 mg/kg, 1 mg/kg and 5 mg/kg 59.9% (RSD 27.8%, n = 9), 57% (n = 2), 72% (RSD 22.4%, n = 6), 107% (RSD 11%, n = 5) and of 95.6% (RSD 2.3%, n = 3), respectively.

Stability of residues in stored analytical samples

The periods of freezer storage between sampling and analysis were recorded for all the residue trials submitted to the 2012 JMPR and were covered by the period of the freezer storage stability studies. Detailed information provided for the 2002, 2006 and 2008 JMPR indicated that residues of imidacloprid and its metabolites desnitro-imidacloprid (WAK 4140, M09), olefin-imidacloprid (WAK 3745, M06), hydroxyl-imidacloprid (WAK 4103, M01) and 6-chloronicotinic acid (6-CNA, M14) were stable in frozen storage for a minimum period of approximately 2 years. New storage stability data were submitted to the 2012 JMPR only for artichoke and beans, dry.

For artichoke, the maximum storage interval for field-treated samples was 770 days in IR-4 Study No 06622. Control samples were fortified with 0.5 mg/kg of imidacloprid and its metabolites WAK 4140, WAK 3745, WAK 4103 and 6-CNA and stored at -18 °C. The mean residues remaining were after 752–758 days of frozen storage for imidacloprid 111% (108, 109, 116%), desnitro-imidacloprid (WAK 4140) 114% (110, 113, 120%), olefin-imidacloprid (WAK 3745) 92% (87, 92, 96%), hydroxyl-imidacloprid (WAK 4103) 90% (85, 86, 99%) and 6-chloronicotinic acid (6-CNA) 99% (92, 95, 111%).

For bean (dry), the maximum storage interval for field-treated samples in IR-4 Study No. 06528 was 967 days. To evaluate storage stability, control samples were fortified with imidacloprid at

a level of 0.5 mg/kg and analysed after 1057 days of frozen storage. The mean residue remaining was 71% (75.1, 66.6 and 70.7%).

USE PATTERN

The information available to the 2012 JMPR on registered uses of imidacloprid in the USA is summarized in Table 1. Copies of labels were made available to the Meeting.

Table 1 Registered uses of imidacloprid.

Crop	Country	Form	Method	Remarks	Application		PHI, days
					No	kg ai/ha	
Artichoke, Globe	USA	SC	Soil	At planting or transplanting	1	0.28-0.56	7
Artichoke, Globe	USA	SC	Foliar	Interval between applications 10 days, per season max. 0.56 kg ai/ha		0.056-0.14	7
Banana	USA	SC	Soil	Chemigation into root-zone through low-pressure drip, trickle, sprinkler		0.28-0.56	0
Banana	USA	SC	Foliar	Minimum interval between applications 14 days, Max. per season 0.56 kg ai/ha	5	0.11	0
Celery	USA	SC	Soil	At planting or transplanting , Chemigation through low-pressure drip, trickle, sprinkler, post seeding drench	1	0.18-0.42	45
Legume vegetables except soya bean (dry)	USA	SC	Soil	Edible podded and succulent shelled pea and bean and dried shelled pea and bean	1	0.28-0.42	21
Legume vegetables except soya bean (dry)	USA	SC	Foliar	Edible podded and succulent shelled pea and bean and dried shelled pea and bean, 7 days interval Maximum per season 0.147 kg ai/ha	3	0.048	7
Tropical fruit: avocado, guava, litchi, papaya, persimmon	USA	SC	Soil	Chemigation through low-pressure drip, trickle, sprinkler	1	0.42-0.56	6
Tropical fruit: avocado, guava, litchi, papaya, persimmon	USA	SC	Foliar	Minimum interval between applications 10 days, per season max. 0.56 kg ai/ha	5	0.11	7

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The Meeting received information on supervised field trials for imidacloprid uses that produced residues in the following commodities,

Commodity	Codex No	Group	Table No
Avocado	FI 0326	Assorted tropical and sub-tropical fruits – inedible peel	2
Banana	FI 0327	Assorted tropical and sub-tropical fruits – inedible peel	3
Litchi	FI 0343	Assorted tropical and sub-tropical fruits – inedible peel	4
Papaya	FI 0350	Assorted tropical and sub-tropical fruits – inedible peel	5
Guava	FT 0336	Assorted tropical and sub-tropical fruits – edible peel	6
Artichoke	VS 0620	Stalk and stem vegetables	7
Celery	VS 0624	Stalk and stem vegetables	8
Beans (dry)	VD 0071	Pulses	9

Trials were well documented with laboratory and field reports. Laboratory reports included method validation with procedural recoveries from spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analysis or duration of residue sample storage were also provided. Undetected residues were generally reported lower than the LOQ.

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 evaluation are underlined. If two field samples were taken or results of two replicate plots were submitted, the mean value was calculated. The residue concentration values were rounded to two significant figures. Total residues were reported as sum of imidacloprid and its metabolites containing the 6-chloropyridinyl moiety, expressed as imidacloprid.

Avocado

Five field trials were conducted in Florida and in Puerto Rico in 2000 by soil application. The results are summarized in Table 2. The residue trials were already submitted to the JMPR in 2008.

Table 2 Imidacloprid residues in avocado, unpeeled fruit without seed

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2000, Homestead, FL, (Peterson)	SC	1	0.56	Soil drench, application date 4/10/00	60 88 116	< 0.05 < 0.05 < 0.05	IR-4 PR No. 07099 00-FL06 2 field samples
USA, 2000, Homestead, FL, (Booth 8)	SC	1	0.56	Soil drench, application date 6/29/00	60	< 0.05	IR-4 PR No. 07099 00-FL61 2 field samples
Puerto Rico, 2000, Santa Isabel, (Simmons)	SC	1	0.54	Soil spray, application date 5/23/00	59	< 0.05	IR-4 PR No. 07099 00-PR02 2 field samples
Puerto Rico, 2000, Santa Isabel, (Butler)	SC	1	0.56	Soil spray, application date 6/2/00	69	< 0.05	IR-4 PR No. 07099 00-PR03 2 field samples
Puerto Rico, 2000, Santa Isabel, (Semil 34)	SC	1	0.56	Soil spray, application date 10/24/00	50	< 0.05	IR-4 PR No. 07099 00-PR05 2 field samples

Banana

Five field trials were conducted in Hawaii in 2001. At each trial, five foliar applications were made 14 days apart. At trial 01-HI05, the 5th foliar application was followed by one soil surface treatment at 0.59 kg ai/ha on the same day. At trial 01-HI04, bunches were bagged following the first application. The results are summarized in Table 3. The residue trials were already submitted to the JMPR in 2008.

Table 3 Imidacloprid residues in banana, whole fruit

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2001, Hilo, HI (Williams)	SC	5	0.112 Total 0.56	Foliar directed, 56, 42, 28, 14, 0 days before harvest	0	0.36, 0.44 Mean <u>0.40</u>	IR-4 PR No. B7333, 01-HI01 2 field samples unbagged
USA, 2001, Keaau, HI (Williams)	SC	5	0.11-0.12 Total 0.58	Foliar directed, 56, 42, 28, 14, 0 days before harvest	0	0.45, 0.50 Mean <u>0.48</u>	IR-4 PR No. B7333, 01-HI02 2 field samples unbagged

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2001, Waimanalo, HI (Apple)	SC	5	0.11-0.12 Total 0.57	Foliar directed, 56, 42, 28, 14, 0 days before harvest	0	0.50, 0.53 Mean 0.52	IR-4 PR No. B7333, 01-HI03 2 field samples unbagged
USA, 2001, Waimanalo, HI (Williams)	SC	5	0.1-0.112 Total 0.55	Foliar directed, 56, 42, 28, 14, 0 days before harvest	0	0.10, 0.13 Mean 0.12	IR-4 PR No. B7333, 01-HI04 2 field samples bagged
USA, 2001, Hilo, HI (Williams)	SC	5	0.112 0.59 Total 1.15	Foliar directed, 56, 42, 28, 14, 0 days before harvest Soil directed, 0 days before harvest	0 3 7 7 14 28	0.42, 0.44 0.47, 0.53 0.56, 0.63 Mean 0.60 0.47, 0.51 0.37, 0.42	IR-4 PR No. B7333, 01-HI05 2 field samples unbagged

Litchi

Three trials on litchi were carried out in 2004 in the USA. At each trial, 5 foliar applications of imidacloprid 9–12 days apart were made. The application rates ranged from 0.112 to 0.115 kg ai/ha per treatment for a total rate of 0.57 kg ai/ha per season. The results are summarized in Table 4.

Table 4 Imidacloprid residues in litchi, whole fruit

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2004, Homestead, FL, (Brewster)	SC	5	0.112-0.115	Foliar spray, last appl. 14-06-2004	7	0.166, 0.159 Mean 0.16	IR-4 PR No. 06676 FL05 2 field samples
USA, 2004, Homestead, FL, (Brewster)	SC	5	0.112-0.115	Foliar spray, last appl. 21-06-2004	7	0.199, 0.214 Mean 0.21	IR-4 PR No. 06676 FL06 2 field samples
USA, 2004, Homestead, FL, (Brewster)	SC	5	0.112-0.115	Foliar spray, last appl. 18-06-2004	6	0.276, 0.251 Mean 0.26	IR-4 PR No. 06676 FL07 2 field samples

Papaya

Four trials were conducted in the USA in 2005. At each trial, 5 foliar applications of imidacloprid 9-11 days apart were made. The application rate ranged from 0.112–0.12 kg ai/ha per treatment for a total rate of 0.56–0.597 kg ai/ha per season. The results are summarized in Table 5.

Table 5 Imidacloprid residues in papaya, non-peeled fruit with seeds

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2005, Homestead, FL, (EXP-15)	SC	5	0.112	Foliar spray, last appl. 23-05-2005	1	0.131, 0.125 Mean 0.13	IR-4 PR No. 09039 FL07 2 field samples
USA, 2005, Pahoa, HI, (Rainbow)	SC	5	0.112-0.118	Foliar spray, last appl. 24-08-2005	1	0.343, 0.353 Mean 0.35	IR-4 PR No. 09039 HI01 2 field samples
USA, 2005, Laie, HI, (Laie Gold GMO)	SC	5	0.112-0.115	Foliar spray, last appl. 30-11-2005	1	0.440, 0.441 Mean 0.44	IR-4 PR No. 09039 HI02 2 field samples
USA, 2005, Pahoa, HI, (Rainbow)	SC	5	0.112-0.121	Foliar spray, last appl. 07/12-2005	1	0.390, 0.334 Mean 0.36	IR-4 PR No. 09039 HI03 2 field samples

Guava

Four trials were conducted in the USA in 2000. At each trial, 5 foliar applications of imidacloprid were made 9–12 days apart. The application rate was 0.112 kg ai/ha per treatment for a total rate of 0.56 kg ai/ha per season. The results are summarized in Table 6.

Table 6 Imidacloprid residues in guava, whole fruit

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 2000, Homestead, FL, (not reported)	SC	5	0.112	Foliar by airblast sprayer, last appl. 19-7-2000	14	0.262, 0.266 Mean 0.26	IR-4 PR No. 7738.00 FL 13 2 field samples
USA, 2000, Homestead, FL, (not reported)	SC	5	0.112	Foliar by airblast sprayer, last appl. 19-07-2000	14	0.126, 0.122 Mean 0.12	IR-4 PR No. 7738.00 FL 14 2 field samples
USA, 2000, Homestead, FL, (not reported)	SC	5	0.112	Foliar by backpack sprayer, last appl. 19-07-2000	15	0.40, 0.35 Mean 0.38	IR-4 PR No. 7738.00 FL 15 2 field samples
USA, 2000, Homestead, FL, (not reported)	SC	5	0.112	Foliar by backpack sprayer, last appl. 19-07-2000	15	0.304, 0.250 Mean 0.28	IR-4 PR No. 7738.00 FL 16 2 field samples

Artichoke

Three field trials were conducted in California. At each trial, 2 foliar applications of imidacloprid were made 20 to 22 days apart and mature artichoke buds were collected 7 days following the final application. The application rate was about 0.28 kg ai/ha per treatment for a total rate of approximately 0.56 kg ai/ha per season. The results are summarized in Table 7.

Table 7 Imidacloprid residues in artichoke

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 1997, Castroville, CA, (Green Globe)	SC	2	0.28-0.299	Foliar spray, last appl. 03-07-1997	7	1.465, 1.638 Mean 1.6	IR-4 PR No. 06622 97-CA60 2 field samples
USA, 1997, Castroville, CA, (Green Globe)	SC	2	0.28	Foliar spray, last appl. 08-07-1997	7	0.957, 1.060 Mean 1.0	IR-4 PR No. 06622 97-CA61 2 field samples
USA, 1997, Castroville, CA, (Green Globe)	SC	2	0.28	Foliar spray, last appl. 08-07-1997	7	1.325, 1.886 Mean 1.6	IR-4 PR No. 06622 97-CA62 2 field samples

Celery

Six field trials were conducted in 1994 in the USA to evaluate residues in untrimmed celery stalks. Imidacloprid was applied as plant drench. At three of the six test locations, two additional application types - soil side dress and in furrow application during transplanting - were conducted side-by-side (bridging) with the plant drench applications. The results are summarized in Table 8. The trials were already submitted to the 2002 JMPR.

Table 8 Imidacloprid residues in celery stalk with foliage, untrimmed

Country, year, location, (variety)	Application					Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	kg ai/hl	Treatment	PHI, days	Total	
USA, 1994, Vero Beach, FL, (1622)	SC	1	0.56	0.007	Plant drench	46	4.3	Bayer Report No. 107126 VBL-AD033-94D
USA, 1994, Howe, IN, (52-70-R)	SC	1	0.59	0.006	Plant drench	43	0.42	Bayer Report No. 107126 HIN-AD032-94D
USA, 1994, Salinas, CA, (T&A Special #1)	SC	1	0.57	0.005	Plant drench	45	0.13	Bayer Report No. 107126 457-AD029-94D
USA, 1994, Los Ebanos, TX, (Valley onion)	SC	1	0.54	0.004	Plant drench	43	0.13	Bayer Report No. 107126 459-AD030-94D
USA, 1994, Fresno, CA, (Conquistador)	SC	1	0.56	0.007	Plant drench	45	0.57	Bayer Report No. 107126 FCA-AD031-94D
USA, 1994, Ephrata, WA, (Tall Utah)	SC	1	0.56	0.006	Plant drench	46	1.0	Bayer Report No. 107126 454-AD028-94D
USA, 1994, Vero Beach, FL, (1622)	SC	1	0.56	0.98	Soil side dress	45	2.8	Bayer Report No. 107126 VBL-AD036-94D
USA, 1994, Howe, IN, (52-70-R)	SC	1	0.56	1.1	Soil side dress	43	0.78	Bayer Report No. 107126 HIN-AD035-94D
USA, 1994, Fresno, CA, (Conquistador)	SC	1	0.56	0.98	Soil side dress	45	5.6	Bayer Report No. 107126 FCA-AD034-94D
USA, 1994, Vero Beach, FL, (1622)	SC	1	0.56	1.1	In furrow [a]	97	1.2	Bayer Report No. 107126 VBL-AD039-94D
USA, 1994, Howe, IN, (52-70-R)	SC	1	0.56	1.2	In furrow [a]	81	0.38	Bayer Report No. 107126 HIN-AD038-94D
USA, 1994, Fresno, CA, (Conquistador)	SC	1	0.56	0.43	In furrow [a]	103	1.4	Bayer Report No. 107126 FCA-AD037-94D

[a] in furrow at transplant

Beans (dry)

Eleven trials were conducted in the USA in 1997-1999. Bean seeds were first treated with 0.25 kg ai/100 kg seed before sowing. At planting, the trials received one in-furrow application of 0.42 kg ai/ha followed by three foliar treatments made 6 to 8 days apart at a rate of approximately 0.049 kg ai/ha per application. At each trial, duplicate samples of dry beans were collected and shelled 6 to 8 days after the final application. At the Washington and 1998 California trials, the pants were cut and left in the field to dry for several days before sample collection (see Table 9).

Table 9 Imidacloprid residues in beans (dry)

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
USA, 1997, Moxee, WA, (Othello dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	7	0.656, 0.766 Mean 0.71	IR-4 PR No. 06528 97-WA35 2 field samples
USA, 1997, Fargo,	SC	1	0.420	In furrow drench	8	0.227, 0.269	IR-4 PR No.

Country, year, location, (variety)	Application				Residues, mg/kg		Report No. Study No. Remarks
	Form	No	kg ai/ha	Treatment	PHI, days	Total	
ND, (Agri 1 dry bean)		3	0.049	Foliar spray		Mean <0.5 (0.25)	06528 97-ND09 2 field samples
USA, 1997, Carrington, ND, (Othello dry bean)	SC	1 3	0.420 0.049	In furrow drench Foliar spray	7	0.180, 0.229 Mean 0.5 (0.205)	IR-4 PR No. 06528 97-ND10 2 field samples
USA, 1998, Geneva, NY, (California Early Light Red Kidney dry bean)	SC	1 3	0.420 0.049	In furrow drench Foliar spray	7	0.860, 1.12 Mean 0.99	IR-4 PR No. 06528 98-NY13 2 field samples
USA, 1998, Arlington, WI (Great Northern dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	6	0.480, 0.698 Mean 0.59	IR-4 PR No. 06528 98-WI18 2 field samples
USA, 1998, Hancock, WI, (Great Northern dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	6	0.624, 0.762 Mean 0.69	IR-4 PR No. 06528 98-WI19 2 field samples
USA, 1998, Salinas, CA, (Appaloosa dry bean)	SC	1 3	0.121 0.049	In furrow Foliar spray	6	0.207, 0.214 Mean <0.5 (0.21)	IR-4 PR No. 06528 98-CA40 2 field samples Last applic. 16-9-1998
USA, 1998, Salinas, CA, (Jacobs cattle dry bean)	SC	1 3	0.121 0.049	In furrow Foliar spray	7	0.118, 0.133 Mean <0.5 (0.13)	IR-4 PR No. 06528 98-CA41 2 field samples Last applic. 2-9-1998
USA, 1998, Moxee, WA, (Othello dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	7	0.687, 0.890 Mean 0.79	IR-4 PR No. 06528 98-WA43 2 field samples
USA, 1999, Salinas, CA, (Pinto dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	8	0.325, 0.350 Mean <0.5 (0.34)	IR-4 PR No. 06528 99-CA130 2 field samples Last applic. 6-10-1999
USA, 1999, Salinas, CA, (Great White dry bean)	SC	1 3	0.420 0.049	In furrow Foliar spray	8	0.466, 0.516 Mean <0.5 (0.49)	IR-4 PR No. 06528 99-CA131 2 field samples Last applic. 14-10-1999

APPRAISAL

Imidacloprid was first evaluated by the JMPR in 2001 for toxicology. The Meeting derived an ADI of 0–0.06 mg/kg bw and an ARfD of 0.4 mg/kg bw. The compound was evaluated for residues in 2002, 2006 and 2008. In 2002, the Meeting agreed that the residue definition for compliance with the MRL and for estimation of dietary intake for plant and animal commodities should be the sum of imidacloprid and its metabolites containing the 6-chloropyridinyl moiety, expressed as imidacloprid.

Imidacloprid was scheduled by the Forty-third Session of the CCPR for residue evaluation of additional crops. The 2012 JMPR received information on GAP and residue data for artichoke, avocado, banana, beans (dry), celery, guava, litchi and papaya.

Methods of analysis

The Meeting received information on analytical methods used for the determination of imidacloprid residues in samples derived from supervised trials on avocado, artichoke, banana, bean (dry), celery, guava, litchi and papaya. Samples were fortified with an equimolar combination of imidacloprid and its metabolites desnitro-imidacloprid, olefin-imidacloprid, hydroxyl-imidacloprid and 6-chloro-nicotinic acid following conversion to 6-chloronicotinic acid-trimethylsilyl ester with 6-N-methyl-trimethylsilyl-trifluoroacetamide (MSTFA) and analysed by GC-MS. The LOQ was 0.05 mg/kg (expressed in parent equivalents) for the crops mentioned above, except for dry beans.

The Meeting noted that the mean recoveries for dry beans were at the fortification levels of 0.1 mg/kg 59.9% (RSD 27.8%, n = 9), of 0.2 mg/kg 57% (n = 2), of 0.5 mg/kg 72% (RSD 22.4%, n = 6), of 1 mg/kg 107% (RSD 11%, n = 5) and of 5 mg/kg 95.6% (RSD 2.3%, n = 3).

The freezer storage stability studies carried out with artichoke and beans, dry showed that the residues were stable for the longest period for which the samples were stored at or below -18 °C. The studies reported by the 2002, 2006 and 2008 JMPR cover the other sample materials evaluated by the present Meeting.

Results of supervised residue trials on crops

The OECD 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 judgment. Then, the OECD calculator was employed. If the statistical calculation spreadsheet suggested a different value from that recommended by the JMPR, a brief explanation of the deviation was provided.

Avocado

The registered GAP on avocado in the USA is soil application at a maximum rate of 0.56 kg ai/ha with a PHI of 6 days, and/or a maximum of five foliar applications at a maximal rate of 0.56 kg ai/ha with an interval of 10 days and a PHI of 7 days. Five field trials[3] were conducted with soil application at 98–104% GAP rate, but a PHI of 50–69 days indicated that no trials matched the registered GAP in the USA.

The Meeting decided that the data were inadequate for the purpose of estimating a maximum residue level for avocado.

Banana

The 2002 JMPR evaluated trials from Africa and Central America with application of 0.25 g ai/plant to the base of the pseudo-trunk or with a single basal drench application of 0.21–0.29 g ai/plant and estimated a maximum residue level of 0.05 mg/kg.

The GAP in the USA is soil application at a maximum rate of 0.56 kg ai/ha with a 0 day PHI and/or a maximum of five foliar applications at a maximum rate of 0.56 kg ai/ha with an interval of 14 days and a 0 day PHI. Five field trials[4] were conducted with foliar application and matched the registered GAP in the USA, four of them with unbagged and one with bagged bananas. Residues in the whole fruit were 0.40, 0.48, 0.52 and 0.60 mg/kg for unbagged bananas and 0.12 mg/kg for bagged bananas.

The Meeting decided that four trials on unbagged and one on bagged bananas were not sufficient to estimate a maximum residue level for such a major crop and that the previous recommendation of 0.05 mg/kg should be maintained.

[3] These residue trials data on avocado were submitted already to the JMPR in 2008.

[4] These residue trials data on banana were submitted already to the JMPR in 2008.

Litchi

Three trials were conducted on litchi in the USA in 2004 with foliar treatment according to GAP (GAP 5 × 0.11 kg ai/ha, PHI 7 days) resulting in residues of 0.16, 0.21 and 0.26 mg/kg. The data were submitted as separate trials but several of the parameters were identical, i.e., location, variety, treatment time and personnel

The Meeting considered the three trials as not independent and concluded that there were insufficient data to estimate a maximum residue level for imidacloprid in litchi.

Papaya

The GAP in the USA is maximal five foliar applications of 0.11 kg ai/ha at a maximal rate of 0.56 kg ai/ha and a PHI of 7 days. Four trials were conducted on papaya in the USA in 2005 with foliar treatment by 5 × 0.11–0.12 kg ai/ha. Residues were 0.13, 0.35, 0.36 and 0.44 mg/kg in samples taken one day after application.

As no trials according to GAP were submitted, the Meeting could not estimate a maximum residue level for imidacloprid in papaya.

Guava

The GAP in the USA is maximum five foliar applications of 0.11 kg ai/ha at a maximum rate of 0.56 kg ai/ha and a PHI of 7 days. Four trials were conducted on guava in the USA in 2000 with foliar treatment by 5 × 0.11 kg ai/ha, samples were taken at a PHI of 14–15 days only. The data were submitted as separate trials but several of the parameters were the same (place, treatment date, personnel). Residues were 0.12, 0.26, 0.28 and 0.38 mg/kg in samples taken 14–15 days after application.

As no trials according to GAP were submitted, the Meeting could not estimate a maximum residue level for imidacloprid in guava.

Artichoke

Three US trials treated in 1997 with foliar application at 2 × 0.28 kg ai/ha and a PHI of 7 days did not match the GAP (0.056–0.14 kg ai/ha, maximum 0.56 kg ai/ha per season, PHI 7 days). Furthermore, the data were submitted as separate trials but several of the parameters were identical, i.e., location, variety, treatment time and personnel.

The Meeting concluded that there were insufficient data to estimate a maximum residue level for imidacloprid in artichoke.

Celery

The US labels for imidacloprid in celery allow soil application with 0.18–0.42 kg ai/ha and a 45 day PHI. Twelve trials[5] with different treatment scenarios were conducted in the USA: In six field trials, plant drench application with 0.54–0.59 kg ai/ha was used, 43–46 days prior to harvest. The remaining six other trials were bridging studies to compare the residues arising from various types of soil applications.

In the trials treated with 0.54–0.59 kg ai/ha, the application rate exceeded the maximum GAP rate of 0.42 kg ai/ha for more than 30% and the residues were 0.13, 0.13, 0.42, 0.57, 1.0 and 4.3 mg/kg. Applying the principle of proportionality (scaling factors of 0.71–0.778), imidacloprid residues in celery were: 0.096, 0.1, 0.3, 0.43, 0.75 and 3.2 mg/kg (n = 6).

The Meeting estimated a maximum residue level of 6 mg/kg, an STMR of 0.365 mg/kg and an HR of 3.2 mg/kg for imidacloprid in celery.

[5] These residue trials data on celery were previously submitted to the 2002 JMPR.

Beans (dry)

The registered GAP in the USA on dried shelled bean (except soya bean) and dried shelled peas is soil application at a maximum rate of 0.42 kg ai/ha with a PHI of 21 days, and/or maximum of three foliar applications of 0.048 kg ai/ha at a maximal rate of 0.147 kg ai/ha with an interval of 7 days and a PHI of 7 days.

Eleven field trials were conducted with the following use pattern: a combination of one seed treatment with 0.25 kg ai/100 kg seed before sowing, one soil application matching the registered soil application GAP and three foliar applications matching the registered foliar application GAP. The residues were < 0.5 (6), 0.59, 0.69, 0.71, 0.79 and 0.99 mg/kg in dry beans. Using the OECD MRL calculator, a maximum residue level of 1.5 mg/kg is calculated. The Meeting was aware of the high uncertainty of this value because 55% of the data population were censored data.

The Meeting noted that the GAP in the USA is the same for dried shelled pea and bean, except soya bean. For peas, dry the 2008 JMPR estimated a maximum residue level of 2 mg/kg and an STMR of 0.62 mg/kg.

The Meeting agreed to extrapolate from beans, dry and peas, dry to pulses and estimated a maximum residue level of 2 mg/kg and an STMR of 0.62 mg/kg for pulses, except soya beans. The previous recommendation for peas, dry of 2 mg/kg should be withdrawn.

Residues in animal commodities

The 2012 JMPR evaluated residues of imidacloprid in beans, dry, which is listed in the OECD feeding table. The Meeting noted that the estimation did not result in a significant change of the dietary burdens of farm animals. The previous MRL recommendations for animal commodities were maintained.

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 the MRL and for estimation of dietary intake) for plant and animal commodities): *Sum of imidacloprid and its metabolites containing the 6-chloropyridinyl moiety, expressed as imidacloprid*.

CCN	Commodity Name	MRL, mg/kg		STMR mg/kg	HR mg/kg
		proposed	Previous		
VS 0624	Celery	6		0.365	3.2
VD 0072	Peas (dry)	W	2		
VD 0070	Pulses (except soya beans)	2		0.62	

DIETARY RISK ASSESSMENT

Long-term intake

The International Estimated Daily Intake (IEDI) of imidacloprid were calculated for the 13 GEMS/Food cluster diets using STMRs and STMR-Ps estimated by the JMPR in 2002, 2006, 2008 and 2012. The results are shown in Annex 3 of the 2012 JMPR Report.

The ADI is 0–0.06 mg/kg bw and the calculated IEDI were 2–5% of the maximum ADI. The Meeting concluded that the long-term intake of residues of imidacloprid from the uses considered by the JMPR is unlikely to present a public health concern.

Short-term intake

The International Estimated Short Term Intakes (IESTIs) of imidacloprid was calculated for the food commodities for which maximum residue levels, STMRs and HRs were estimated by the current Meeting and for which consumption data was available. The results are shown in Annex 4 of the 2012 JMPR Report.

The IESTIs represented 0–30% of the ARfD (0.4 mg/kg bw). The Meeting concluded that the short-term intake of residues of imidacloprid from uses considered by the current Meeting was unlikely to present a public health concern.

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