CYPRODINIL (207)

First draft prepared by Dr J Cudmore, Chemicals Regulation Division of the Health and Safety Executive, UK

EXPLANATION

Cyprodinil is a fungicide belonging to the anilinopyridine group. It is a systemic foliar and seed dressing fungicide that acts as an inhibitor of methionine biosynthesis. Cyprodinil has been registered in many countries to control a range of fungal diseases in cereals, grapes, pome fruit, stone fruit, strawberries, vegetables, field crops and ornamentals, and as a seed dressing for barley.

Cyprodinil was first evaluated by the JMPR in 2003, when an ADI of 0–0.03 mg/kg bw/day was established. The meeting decided that an ARfD was unnecessary. The residue definition for both plants and animal commodities, for both compliance with MRLs and estimation of dietary intakes, is defined as cyprodinil. The residue is fat soluble.

In 2013 and 2015 the JMPR evaluated additional uses for cyprodinil on multiple crops.

At the 47th Session of the CCPR (2015), cyprodinil was scheduled for evaluation of additional use patterns by the 2017 JMPR. The current meeting received residue data for artichoke, carrots, celery, fresh beans with pods, guava, pomegranate, potato, almonds, pecans and pistachio.

RESIDUE ANALYSIS

Analytical methods

A number of methods have been used to determine residues of cyprodinil in the crops, a number of which have been considered by the JMPR previously. For this meeting the additional methods and validation data outlined below were considered;

Method GRM010.02A

This method was used to determine cyprodinil residues in tree nuts and potato. The method is a modification of method REM 141.01.Plant samples are homogenized and extracted with methanol/water (80:20; v/v). Nut samples are extracted for a further 5 minutes with acidified methanol/water (80:20; v/v). Aliquots of the extracts are cleaned-up using solid phase extraction cartridges (HLB phase). Cyprodinil is eluted in 0.1% ammonium acetate/acetonitrile (40:60; v/v). Final determination is by HPLC-MS/MS (quantification transition m/z=226→93, confirmation transition; m/z=226→77). The method has an LOQ of 0.01 mg/kg. The method was validated prior to its use for the analyses of the residue trial samples. The linearity of the detector response covered a working range of 0.01–0.2 ng/mL. For the crops considered in this meeting recovery data are outlined in Table1. Recovery data were also provided for a range of other crops as outlined in Table 2, this included an ILV for rape seed oil.

Table 1 Recovery data for method GRM010.02A

Matrix	Fortification level [mg/kg]	Individual recoveries [%]	Range of recoveries [%]	Mean recovery [%]	RSD
Potato	0.01	83, 78, 82	78-83	81	3
	0.1	88, 81, 87	81-88	85	4.3
Almond nutmeat	0.01	78, 71, 78	71-78	76	5.3
	1.0	71, 71, 83	71-83	75	9.2
Almond hulls	0.01	85, 105, 89	85-105	93	11
	1.0	75, 79, 74	74-79	76	3.5

Table 2 Additional recovery data for method GRM010.02A

Matrix	Fortification level [mg/kg]	Individual recoveries [%]	Range of recoveries [%]	Mean recovery [%]	RSD
Tomato	0.01	83, 82, 83, 86, 83	82-86	83	1.8
MRM 226→93 (quantification)	0.1	81, 83, 81, 94, 83	81-94	84	6.5
Tomato	0.01	86, 87, 92, 86, 88	86-92	88	2.8
MRM 226→77 (confirmation)	0.1	91, 78, 81, 89, 80	78-91	84	6.9
Wheat hay	0.01	79, 80, 83, 80, 79	79-83	80	2.0
MRM 226→93 (quantification)	0.1	79, 82, 83, 82, 83	79-83	82	2.0
Wheat hay	0.01	78, 84, 77, 80, 82	78-84	80	3.6
MRM 226→77 (confirmation)	0.1	87, 84, 88, 87, 86	84-88	86	1.8
Almond nutmeat	0.01	84, 82, 85, 83, 77	77-85	82	3.8
MRM 226→93 (quantification)	0.1	93, 88, 72, 83, 89	72-93	85	9.5
Almond nutmeat	0.01	88, 88, 81, 83, 86	81-88	85	3.7
MRM 226→77 (confirmation)	0.1	91, 87, 81, 84, 88	81-91	86	4.4
Almond hulls	0.01	76, 73, 69, 72, 77	69-77	73	4.4
MRM 226→93 (quantification)	0.1	87, 94, 78, 79, 76	76-94	83	9.1
Almond hulls	0.01	76, 82, 75, 80, 84	75-84	79	4.8
MRM 226→77 (confirmation)	0.1	83, 84, 81, 74, 79	74-84	81	4.9
Wheat grain	0.01	76, 80, 83, 85, 71	71-85	79	7.1
MRM 226→93 (quantification)	0.1	86, 86, 77, 81, 72	72-86	80	7.6
Wheat grain	0.01	84, 82, 75, 84, 73	73-84	80	6.6
MRM 226→77 (confirmation)	0.1	79, 83, 76, 80, 71	71-83	78	5.8
Wheat forage	0.01	81, 98, 83, 82, 82	81-98	85	8.4
MRM 226→93 (quantification)	0.1	94, 85, 87, 84, 91	84-94	88	4.8
Wheat forage	0.01	85, 96, 83, 82, 78	78-96	85	8.0
MRM 226→77 (confirmation)	0.1	87, 90, 88, 80, 87	80-90	86	4.4
Apple	0.01	90, 86, 82, 86, 86	82-90	86	3.3
MRM 226→93 (quantification)	0.1	88, 86, 70, 71, 87	70-88	80	11
Apple	0.01	88, 80, 89, 87, 84	80-89	86	4.3
MRM 226→77 (confirmation)	0.1	91, 87, 75, 76, 99	75-99	86	12
Potato	0.01	83, 78, 82	78-83	81	3.0
MRM 226→93 (quantification)	0.1	88, 81, 87	81-88	85	4.3
Almond nutmeat	0.01	78, 71, 78	71-78	76	5.3
MRM 226→93 (quantification)	1.0	71, 71, 83	71-83	75	9.2
Almond hulls	0.01	85, 105, 89	85-105	93	11
MRM 226→93 (quantification)	1.0	75, 79, 74	74-79	76	3.5
ILV					
Oilseed rape seed	0.01	100, 98, 99, 100, 98	98-100	99	1.0
MRM 226→93 (quantification)	0.1	74, 73, 78, 71, 69	69-78	73	4.6
Oilseed rape seed	0.01	100, 101, 97, 101, 99	97-101	100	1.7
MRM 226→77 (confirmation)	0.1	73, 73, 76, 71, 70	70-76	73	3.2

Method REM 141.10

This method was used to determine residues of cyprodinil in carrots.

Plant samples are homogenized and extracted with methanol/water (70:30). Aliquots of the extracts are acidified and cleaned-up using solid phase extraction cartridges (SCX phase). Cyprodinil is eluted in methanol/35% ammonia (95:5); the eluate is evaporated and dissolved in mobile phase. Final determination is by LC-MS/MS (quantification transition m/z = 226→93, confirmation transition; m/z = 226→77). The method has an LOQ of 0.01 mg/kg. The method was validated in conjunction with the analyses of the residue trial samples. The linearity of the detector response covered a working range of 0.5–2000 ng/mL. The recovery data are outlined in Table 3. Additional recovery data for this method for other crops are outlined in Table4.

Table 3 Recovery data for method REM 141.10

Matrix	Fortification level [mg/kg]	Individual recoveries [%]	Range of recoveries [%]	Mean recovery [%]	RSD [%]
Carrot MRM 226.4→93.1 (quantification)	0.01	76, 110	76-110	93	3
	0.1	84, 93	84-93	89	6
	2	88	88	88	-
Carrot MRM 226.0→92.6 (quantification)	0.01	76	76	76	-
	0.1	72	72	72	-
	1	76	76	76	-
Carrot MRM 226.0→93.1 (quantification)	0.01	107	107	107	-
	0.1	98	98	98	-
	2	82	82	82	-
Carrot MRM 226.0→93.1 (quantification)	0.01	93, 100	93-100	97	5
	0.1	90, 94	90-94	92	3
Carrot MRM 226.4→92.6 (quantification)	0.01	72, 72, 79	72-79	74	4
	0.1	88, 88, 110	88-110	95	13
Carrot MRM 226.0→93.1 (quantification)	0.01	80	80	80	-
	0.10	80	80	80	-
	1.00	76	76	76	-
Carrot MRM 226.0→93.1 (quantification)	0.01	90, 94	90-94	92	3
	0.1	89	89	89	-
	1	88	88	88	-
Carrot MRM 226.4→92.6 (quantification)	0.01	83, 87, 105	83-105	92	12
	0.1	86, 90, 99	86-99	92	7
	0.5	104	104	104	-
Carrot MRM 226.4→92.6 (quantification)	0.01	80, 83, 85	80-85	83	3
	0.1	88, 88	88	88	-
	0.5	82	82	82	-

Table 4 Additional recovery data for method REM 141.10

Matrix	Fortification level [mg/kg]	Individual recoveries [%]	Range of recoveries [%]	Mean recovery [%]	RSD [%]
Orange MRM 225.1→92.9 (quantification)	0.01	78, 75, 78, 71, 73	71-78	75	4
	2	72, 73, 81, 85, 89	72-89	80	9
Lettuce MRM 225.1→92.9 (quantification)	0.01	75, 77, 85, 75, 81	75-85	79	6
	10	80, 76, 88, 97, 79	76-97	84	10
Barley grain MRM 225.1→92.9 (quantification)	0.01	91, 94, 88, 87, 88	87-94	90	3
	2	80, 80, 81, 81, 84	80-84	81	2

Matrix	Fortification level [mg/kg]	Individual recoveries [%]	Range of recoveries [%]	Mean recovery [%]	RSD [%]
Barley straw	0.01	88, 73, 72, 80, 78	72-88	78	8
MRM 225.1→92.9 (quantification)	3	79, 83, 82, 77, 73	73-83	79	5
Sunflower seed	0.01	41, 44, 41, 36, 39	36-44	40	7
MRM 225.1→92.9 (quantification)	0.1	43, 39, 43, 44, 42	39-44	42	5

Stability of residues in stored analytical samples

The freezer storage stability of cyprodinil has been assessed previously by the JMPR.

In 2003 the JMPR assessed the stability of incurred cyprodinil residues in peach, grapes, apples, wheat ears, and wheat stalks, and of fortified residues in strawberries, potatoes and wine. Acceptable stability was observed in all of these matrices over 24 months storage at -18 °C, except peaches where storage beyond 9 months was "questionable" but possibly the result of analytical difficulties given the low and variable procedural recoveries obtained.

Additional storage stability data were evaluated by the JMPR meeting 2013. Storage stability data were determined concurrently with sample storage as part of the analytical phase of the residue trials submitted to the Meeting. Cyprodinil was shown to be stable for periods up to 601 days in a wide range of frozen plant matrices.

In the 2015 JMPR meeting, the storage stability of cyprodinil in oilseed rape (seed, meal, oil) was evaluated and confirmed over a period of 9 months.

Storage stability data was determined concurrently with sample storage as part of the analytical phase of the residue trials submitted to the Meeting for guava, pomegranate and artichoke. The storage intervals for the plant matrices in the residue trials are tabulated below (Table 5), together with storage stability data.

Table 5 Storage stability data for cyprodinil residues in frozen plant matrices

Matrix	Sample storage interval (days)	Test storage interval (days)	Fortification level (mg/kg)	Stored recoveries (%)	Procedural recoveries (%)
Guava	658	657	0.2	74, 89, 72 (78)	89
Pomegranate	328	302	2.0	125, 126, 124 (125)	80
Artichoke	62	0	0.2	92, 93, 94 (93)	92
		247	0.2	91, 91, 89 (90)	83

Values in parentheses = mean recovery of stored samples

The maximum time period for which samples were stored in the residue trials considered by this meeting is outlined in Table 6.

Table 6 Length of freezer storage for trials considered in 2017 meeting

Crop	Length of storage (days)
Guava	658
Pomegranate	328
Beans, Fresh with pods	325
Artichoke, Globe	62
Celery	220
Carrot	283
Potato	464
Tree nuts (nutmeat) - pecan and almond	300
Pistachio	211
Processed carrot fractions	272

Crop	Length of storage (days)
Processed potato fractions	464

In this meeting stability data were provided for guava, pomegranate and artichoke.

For guava and artichoke the data considered in this meeting supports the length of storage of the samples from the trials.

For pomegranate the samples in the trials were stored slightly longer than the storage period covered (328 days compared to 302 days). However, given no decline in the residues was observed after 302 days in pomegranate and given that previous data shows that cyprodinil was stable in a range of crops, including high acid, for over 24 months then the storage period in the trials is regarded as supported.

The stability of residues has been assessed previously by the JMPR for a range of crop matrices.

The maximum length of storage of a crop of high water content (beans with pods and celery) was 325 days. The data previously evaluated by the JMPR supports longer storage periods of over 24 months.

For crops high in starch content (carrot, potato) the maximum length of storage of the RAC was 464 days. Data previously evaluated by the JMPR supports longer storage intervals in these crop matrices for over 24 months.

Pistachio, pecan and almond are crops high in oil content. Data considered by the JMPR in 2015 supports the storage stability in these crops for a 9 month period. In 2013 data for avocado showed that the active was stable for 229 days. Pistachio samples were stored for up to 211 days and the previous data supports this length of storage. Pecan and almond samples (nutmeat) were stored for up to 300 days. While the available data does not cover 300 days of storage, given that there was no decline in residues after 229 days in avocado or after 9 months (approx. 270 days) of storage in rape seeds, rape seed meal and rape seed oil then the meeting considered that the storage interval in the trials was covered. Guava and pomegranate do not belong to a specific crop category.

For the processed fractions of carrot and potato as there was no decline of residues observed in a range of crop categories then the storage period is regarded as supported.

USE PATTERN

Cyprodinil is a systemic fungicide. Table 7 represents a summary of the additional GAPs submitted for consideration in this Meeting.

Table 7 List of additional uses of cyprodinil submitted in 2017

Crop	Country	Indoor/outdoor	Type	Timing of application	Rate (g ai/ha)	No. of appl (interval)	PHI (days)
Guava	USA	Outdoor	Foliar	First application during early bloom	368	4 (7)	0
Pomegranate	USA	Post- harvest	30 second dip/ drench with wax	-	54 g ai/hL	2 [a]	0
Beans, Fresh with pods	Spain	Protected	Foliar	BBCH 51-79	375	2 (10)	3
Artichoke, Globe	USA	Outdoor	Foliar	-	366	4 (14)	3
Celery	USA	Outdoor	Foliar	-	368	4 (7)	0
Carrot	Germany	Outdoor	Foliar	-	375	3 (7)	7
Potato	USA	Outdoor	Foliar	-	366	4 (7)	14
Tree nuts (whole	USA	Outdoor	Foliar	-	366	4 (14)	14

Crop	Country	Indoor/outdoor	Type	Timing of application	Rate (g ai/ha)	No. of appl (interval)	PHI (days)
group except almond and pistachio)							
Pistachio	USA	Outdoor	Foliar	-	368	4 (14)	7

[a] One application before storage and one application before trading

Hyphen means "not specified" or "not defined".

RESULTS OF SUPERVISED RESIDUE TRIALS ON CROPS

Guava

Five residue trials were conducted in the USA in 2010 and 2011.

Four foliar applications were made using an EW formulation at a nominal rate of 368 g ai/ha. An adjuvant was applied in each tank mix.

Samples of guava whole fruits were collected at normal commercial harvest, on the same day of application immediately after the spray deposit has dried.

Samples were immediately frozen and maintained in frozen storage for periods of up to 658 days prior to extraction and analysis.

Residues of cyprodinil in guava were determined using analytical method AG-631B. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg, 0.2 mg/kg and 2 mg/kg with recoveries in the range of 73–88%.

All trials were conducted in NAFTA region 13, at two field sites in two different growing seasons.

Trials 10-F 11 and 10-FL 12 were both conducted in the same location in the same season. In addition, the same crop variety was treated and the dates of treatment at each site were only a few days apart. Consequently, the trials are not regarded as independent trials and the highest residue has been taken from these replicate trials. Trials 10-HI01 and 10-HI09 were also both conducted at the same trial site in the same season. Although the same crop variety was treated the dates of treatment in trial 10-HI09 occurred over 50 days after those in trial 10-HI01. Consequently, the trials can be regarded as independent trials.

Table 8 Residues in Guava from supervised trials in USA involving 4 foliar applications of cyprodinil

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	368 g ai/ha × 4	7	First application during early bloom	0	-	-	-
Homestead, Florida, USA [a] 2010 Guava / Homestead	437 368 397 393	8 20 8	fruiting fruiting fruiting fruiting	0	Fruit	0.353, 0.380 (0.367)	Report: IR-4 07127 Trial: 10-FL11 Trials 10-FL 11 and 10-FL 12 are replicate trials.
Homestead, Florida, USA [a] 2010 Guava / Homestead	369 398 423 412	7 21 7	fruiting fruiting fruiting fruiting	0	Fruit	0.345, 0.360 (0.353)	Report: IR-4 07127 Trial: 10-FL12 Trials 10-FL 11 and 10-FL 12 are replicate trials.

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Homestead, Florida, USA (EPA region 13) 2011 Guava / Homestead	366 368 366 366	7 21 8	fruiting fruiting fruiting fruiting	0	Fruit	0.408, 0.574 (0.49)	Report: IR-4 07127 Trial: 10-FL13
Hilo, Hawaii, USA (EPA region)[b] 2011 Guava / Beaumont	370 368 380 373	7 21 7	bearing bearing bearing bearing	0	Fruit	0.461, 0.505 (0.48)	Report: IR-4 07127 Trial: 10-HI01
Hilo, Hawaii, USA (EPA region)[b] 2011 Guava / Beaumont	368 370 373 362	7 21 7	bearing bearing bearing bearing	0	Fruit	0.626, 0.417 (0.52)	Report: IR-4 07127 Trial: 11-HI09

Values in parentheses = mean of two independent representative treated samples taken at the trial site

[a] Replicate trials, HR taken.

[b] Trials regarded as independent trials based on dates of treatment

Pomegranate

Samples of pomegranate were collected prior to treatment from four trial sites (three different locations) in the USA in 2011. The post-harvest treatments were then all undertaken at the same facility. The following post-harvest application scenarios were performed for the samples:

Scenario 1: A WG formulation was applied to commercially grown fruit as a post- harvest dip treatment at 55 g ai/hL of solution which also contained wax at 0.25–20%. The fruits were dipped in the solution for 30 (±3) seconds and then allowed to drain and air dry on a wire rack.

Scenario 2: A WG formulation was applied two times to fruit as post- harvest dip treatments at 55 g ai/hL of solution per treatment which also contained wax at 0.28–20% in the first dipping solution and no wax in the second dipping solution. The fruit were dipped in the fungicide solution for 30 (±3) seconds during each application and then allowed to drain on a wire rack. The fruits were allowed to dry between the two applications and after the second application.

Scenario 3: A WG formulation was applied once to the fruits as post- harvest dip treatment at 55 g ai/hL of solution per treatment which also contained wax at a concentration of 0.29–20%. After drying, the fruits were treated with a high volume drench, with cyprodinil at 55 g ai/hL with no wax, while moving along a packing line. After the second application the fruits were allowed to drain and air-dry on a wire rack.

The US GAP involves 2 post-harvest dipping/drench treatments of 30 seconds at a rate of 204 g ai in 378 L of water, wax/emulsion or an aqueous dilution of wax/oil (54 g ai/hL). Therefore, scenarios 2 and 3 represent the authorised GAP.

Samples were collected on the same day as the last treatment as soon as the spray had dried and immediately frozen and maintained in frozen storage for periods of up to 328 days prior to extraction.

Residues of cyprodinil in pomegranate were determined using analytical method AG-631B. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg, 0.2 mg/kg and 10 mg/kg with recoveries in the range of 68–86%.

Table 9 Residues in Pomegranate from supervised trials in USA involving two post-harvest treatments with cyprodinil

Location, Country Year, Crop/variety	Rate (g ai/hL)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
USA	54 g ai/hL×2[a)]	-	Maturity	0	-	-	-
California, USA	54.8 (dip) (Wax, 0.28%)	-	Mature fruit	0	Whole fruit	1.42, 1.34 (1.38)	Report: IR-4 10613 Trial: 11-CA58
2011	55.0 (dip) (Wax, 0.28%)	0		0	Whole fruit	2.89, 2.22 (2.6)	
Pomegranate / Wonderful	55.0 (dip) (—)						
Date of treatment: 11/10/11	55.0 (dip) (Wax, 0.34%)	0		0	Whole fruit	1.77, 1.64 (1.7)	
	55.0 (drench) (—)						
California, USA	54.0 (dip) (Wax, 20%)	-	Mature fruit	0	Whole fruit	0.86, 1.00 (0.93)	Report: IR-4 10613 Trial: 11-CA59 - Study to GLP
2011	54.0 (dip) (Wax, 20%)	0		0	Whole fruit	3.42, 3.41 (3.4)	
Pomegranate / Wonderful	54.0 (dip) (—)						
Date of treatment: 14/10/11	54.0 (dip) (Wax, 20%)	0		0	Whole fruit	1.80, 2.69 (2.3)	
	54.0 (drench) (—)						
California, USA	54.2 (dip) (Wax, 0.25%)	-	Mature fruit	0	Whole fruit	1.60, 1.44 (1.5)	Report: IR-4 10613 Trial: 11-CA60
2011	54.2 (dip) (Wax, 0.29%)	0		0	Whole fruit	3.15, 3.36 (3.3)	
Pomegranate / Wonderful	54.2 (dip) (—)						
Date of treatment: 18/10/11	54.2 (dip) (Wax, 0.29%)	0		0	Whole fruit	1.69, 2.29 (2.0)	
	54.2 (drench) (—)						
California, USA	54.0 (dip) (Wax, 20%)	-	Mature fruit	0	Whole fruit	0.245, 0.243 (0.24)	Report: IR-4 10613 Trial: 11-CA61
2011	54.0 (dip) (Wax, 20%)	0			Whole fruit	3.60, 2.92 (3.3)	
Pomegranate / Wonderful	54.0 (dip) (—)						
Date of treatment: 25/10/11	54.0 (dip) (Wax, 20%)	0		0	Whole fruit	0.676, 0.375 (0.53)	
	54.5 (drench) (—)						

Values in parentheses = mean of two independent representative treated samples taken at the trial site

[a] 30 second dip/drench with wax; one application before storage and one application before trading

Beans, Fresh with pods (protected)

Nine supervised greenhouse trials with cyprodinil on beans (fresh with pods) were conducted in Spain (Europe) in 2004. Three foliar applications were made with a WG formulation at a nominal rate of 375 g ai/ha. Samples of fresh pods were collected at normal commercial harvest, on the day of application and at 1 and 3 days after application. In one decline trial additional samples were taken immediately before the last application and at 7, 14 and 21 days after application.

Several of the trials were conducted at the same trial site within the same year (trials AF/7741/FX/1 and AF/7741/FX/7, and trials AF/7741/FX/6 and AF/7741/FX/8). However, in each case different crop varieties were treated and the treatment dates were undertaken at least 6 months apart. The trials are therefore independent trials.

Samples were taken and frozen immediately prior to analysis. The maximum length of frozen storage was 325 days.

Residues of cyprodinil in beans (fresh with pods) were determined using analytical method REM 141.01. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg and 2 mg/kg with recoveries in the range of 90–109%.

Table 10 Residues in Beans (fresh with pods) from supervised trials in Spain involving 3 foliar applications of cyprodinil (protected use)

Location, Country Year, Crop/ Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP Spain	375 g ai/ha ×2	10	BBCH 51-79	3	-	-	-
Balerma, El Ejido, Almeria, Spain[a] 2004 Fresh bean / Donna	362 357 365	 10 10	BBCH 61 BBCH 75 BBCH 79	0 1 3	Bean with pod	0.81 0.85 <u>0.47</u>	Report: AF/7741/FX Trial: AF/7741/FX/1
Berja, Almeria, Spain 2004 Fresh bean / Donna	367 381 374	 10 10	BBCH 71 BBCH 78 BBCH 79	0 1 3	Bean with pod	1.11 1.25 <u>0.58</u>	Report: AF/7741/FX Trial: AF/7741/FX/2
Berja, Almeria, Spain 2004 Fresh bean / Donna	365 391 375	 10 10	BBCH 79 BBCH 72 BBCH 79	0 1 3	Bean with pod	1.28 0.80 <u>0.83</u>	Report: AF/7741/FX Trial: AF/7741/FX/3

Location, Country Year, Crop/ Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Balamegra, Almeria, Spain 2004 Fresh bean / Donna	380 359 366	 10 10	BBCH 72 BBCH 71 BBCH 79	0 1 3	Bean with pod	0.87 0.98 <u>0.54</u>	Report: AF/7741/FX Trial: AF/7741/FX/4
Adra, Almeria, Spain 2004 Fresh bean / Helda	390 382 369	 10 10	BBCH 59 BBCH 69-71 BBCH 79	0 1 3	Bean with pod	0.83 0.67 <u>0.60</u>	Report: AF/7741/FX Trial: AF/7741/FX/5
El Ejido, Almeria, Spain[a] 2004 Fresh bean / Oriente	361 387 378	 10 10	BBCH 61 BBCH 71 BBCH 78	0 1 3	Bean with pod	1.72 0.91 <u>0.61</u>	Report: AF/7741/FX Trial: AF/7741/FX/6
Balerma, Almeria, Spain[a] 2004 Fresh bean / Maria	360 364 372	 10 10	BBCH 74 BBCH 73 BBCH 78	0 1 3	Bean with pod	1.87 1.61 <u>1.15</u>	Report: AF/7741/FX Trial: AF/7741/FX/7
El Ejido, Almeria, Spain[a] 2004 Fresh bean / Donna	363 378 374	 10 10	BBCH 71 BBCH 73 BBCH 79	0 1 3	Bean with pod	1.16 1.36 <u>0.75</u>	Report: AF/7741/FX Trial: AF/7741/FX/8
El Ejido, Almeria, Spain 2004 Fresh bean / Festival	397 374 371	 10 11	BBCH 72 BBCH 75 BBCH 77	-0 0 3 7 14 21	Bean with pod	0.07 0.79 <u>0.34</u> 0.19 0.02 < 0.02	Report: 04-0411 Trial: ES-FR-04-0155

[a] Trials AF/7741/FX/1 and AF/7741/FX/7, and trials AF/7741/FX/6 and AF/7741/FX/8 are regarded as independent trials based on dates of treatments and different crop varieties used

Artichoke, Globe

Four residue trials were conducted in the USA in 2010. The trials were conducted at four independent trial sites within California. Four foliar applications were made with a EW formulation at a nominal rate of 366 g ai/ha in 3 of the trials. In a 4th trial five applications were made to allow the crop to reach maturity. A non-ionic surfactant or a crop oil concentrate was included in each tank mix. The applications were made 12 to 16 days apart. Duplicate samples were taken and analysed and the mean

residue is underlined. Samples were taken and frozen immediately prior to analysis. The maximum length of frozen storage was 62 days.

Residues of cyprodinil in artichoke flower buds were determined using analytical method AG-631B. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg and 2 mg/kg with recoveries in the range of 79–110%.

Table 11 Residues in Artichoke (Globe) from supervised trials in USA involving 4 foliar applications of cyprodinil (5 applications in one trial)

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	366 g ai/ha × 4	14	Not defined	3	-	-	-
Castroville, CA. U.S.A[a] 2010 Artichoke/ Green globe	370 366 361 365	14 15 12	Vegetative Vegetative Producing Producing	3	Flower buds	1.32, 1.34 (1.3)	Syngenta File No. A16001A_50051; IR-4 PR No. 10387
Marina, CA. U.S.A. 2010 Artichoke/ Green globe	362 366 365 365	14 15 12	Producing Producing Producing Producing	3	Flower buds	1.05, 1.52 (1.3)	Syngenta File No. A16001A_50051; IR-4 PR No. 10387
Castroville, CA. U.S.A[a] 2010 Artichoke/ Green globe	366 365 365 360	13 14 13	Producing Producing Producing Producing	3	Flower buds	0.825, 1.45 (1.1)	Syngenta File No. A16001A_50051; IR-4 PR No. 10387
Watsonville, CA. U.S.A. 2010 Artichoke / F1 1860	372 367 372 372 372	14 15 16 16	Vegetative Vegetative Vegetative Vegetative Producing	3	Flower buds	0.998, 0.865 (0.93)	Syngenta File No. A16001A_50051; IR-4 PR No. 10387

[a] Trials were conducted at different trial sites on different dates and are independent trials

Celery

Eight residue trials were conducted in the USA in 2009. The trials were conducted at independent trial sites within NAFTA region 3, 5 and 10. Four foliar applications were made with a WG formulation at a nominal rate of 368 g ai/ha. A non-ionic surfactant or a crop oil concentrate was also applied with each application.

Samples were taken and frozen immediately prior to analysis. The maximum length of frozen storage was 220 days.

At each trial site two representative samples were taken and analysed. As each result represents a repetition of the same experimental conditions, the mean residue level has been taken. In some cases the same sample was analysed repeatedly; the mean residue level has also been taken from these results.

Residues of cyprodinil in celery were determined using analytical method AG-597B. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg and mg/kg with recoveries in the range of 86–107%.

Table 12 Residues in Celery from supervised trials in USA involving 4 foliar applications of cyprodinil

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	**368 g ai/ha × 4**	**7**	**Not defined**	**0**	**-**	**-**	**-**
Bradenton, Florida, USA Celery / Golden Blanch	363 364 368 360	7 7 7	Vegetative Vegetative Vegetative Vegetative	0	Stalks	16, 17 (16)	Report: T008508-08 Trial: E16-9141
Belle Glade, Florida, USA Celery / Walt's Pride	365 375 379 372	7 7 7	BBCH 46 BBCH 47 BBCH 48 BBCH 49	0	Stalks	5.9, 5.8 (5.9)	Report: T008508-08 Trial: E19-9142
Fitchburg, Wisconsin, USA Celery / Tango	367 363 377 373	7 7 7	BBCH 45 BBCH 47 BBCH 49 BBCH 49	0	Stalks	13, 11 (12)	Report: T008508-08 Trial: C08-9143
Hughson, California, USA Celery / Conquistador	371 367 371 358	7 7 7	BBCH 77 BBCH 77 BBCH 49 BBCH 49	0	Stalks	9.4, 10 (9.7)	Report: T008508-08 Trial: W26-9144
Madera, California, USA Celery/ Salyer Sonora	369 369 373 371	7 7 7	BBCH 85 BBCH 85 BBCH 85 BBCH 85	0 3 7 10	Stalks	9.6[a], 12[a] (11) 7.7, 8.2 (8.0) 7.5, 7.3 (7.4) 6.0, 6.1 (6.1)	Report: T008508-08 Trial: W29-9145
Gonzales, California, USA Celery /SSC1	369 377 369 357	7 7 7	6 w until harvest 26 leaves mature mature	0	Stalks	3.4, 3.6 (3.5)	Report: T008508-08 Trial: W28-9146
King City, California, USA Celery / Hill's Special	379 372 372 377	7 7 7	BBCH 39 BBCH 45 BBCH 47 BBCH 49	0	Stalks	3.2[a], 4.0[a] (3.6)	Report: T008508-08 Trial: W32-9147
Guadalupe, California, Celery / Mission	372 378 370 370	7 7 7	BBCH 43 BBCH 45 BBCH 77 BBCH 85	0	Stalks	6.3[a], 8.1[a] (7.2)	Report: T008508-08 Trial: W33-9148

Values in parentheses = mean of two independent representative treated samples taken at the trial site

[a] Mean of multiple analysis of the same sample

Carrot

Twenty residue trials were conducted in Europe in 2005, 2006 and 2009. The trials were conducted at independent trial sites within France, Italy, Spain and Switzerland. Three foliar applications were made with a WG formulation or an EC formulation at a nominal rate of 375 g ai/ha in eighteen of the trials.

Two of the trials (CH-FR-06-0133 and CH-FR-06-0134) were conducted at the same trial location in the same season. The planting dates were 19th April 2006 and 13th June 2006 respectively,

which is > 30 days apart. In addition, different varieties of carrots were tested. It is therefore considered that these two trials can be regarded as independent trials.

Samples were taken and frozen immediately prior to analysis. The maximum length of frozen storage was 283 days.

Residues of cyprodinil in carrots were determined using analytical method REM 141.10. Procedural recoveries were conducted at fortification levels ranging from 0.01 mg/kg to 2 mg/kg with recoveries in the range of 70–110%.

Table 13 Residues in Carrot from supervised trials in Europe involving 3 foliar applications of cyprodinil

Location, Country Year, Crop/ Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP Germany	375 g ai/ha ×3	7	Not defined	7	-	-	-
Lacrost, 71290, France (NEU) 2005 Carrot/ Bolero	366 405 369	14 14	BBCH 72 BBCH 73 BBCH 74	-0 0 3 7 14 21	Root	0.45 0.34 0.41 <u>0.53</u> 0.29 0.25	Report: 05-0402 Trial: AF/8554/SY/1
Saint Lambert des Levees, 49400, France (NEU) 2005 Carrot/ Chambord (short cycle)	366 368 375	12 11	BBCH 41 BBCH 48 BBCH 48	-0 0 3 7 14 21	Roots	0.33 0.45 1.05 <u>0.51</u> 0.41 0.26	Report: 05-0402 Trial: AF/8554/SY/2
Ponthiole, France (NEU) 2005 Carrot/ Boero	382 390 365	12 12	BBCH 46-47 BBCH 47-48 BBCH 48/49	-0 0 3 7 14 21	Roots	0.29 0.40 0.48 <u>0.48</u> 0.28 0.34	Report: 05-0605 Trial: FR-FR-05-0472
La Chappelle de Guinchay, France (NEU) 2005 Carrot/ Napoli	408 379 375	10 13	BBCH 41-42 BBCH 42-44 BBCH 45-47	-0 0 3 7 14 21	Roots	0.44 0.55 0.48 <u>1.04</u> 0.67 0.45	Report: 05-0610 Trial: FR-FR-05-0474
Forest Montier, France (NEU) 2006 Carrot/ Solo	357 349 386	11 11	BBCH 41 BBCH 42 BBCH 45	-0 0 3 6 14 20	Roots	0.34 0.27 0.27 <u>0.33</u> 0.29 0.27	Report: T001818-06-REG Trial: FR-FR-06-0080
Vouvry, Switzerland (NEU)[a] 2006 Carrot / Nantaise Selma	356 388 370	12 11	BBCH 41 BBCH 42 BBCH 45	-0 0 3 7 14 21	Roots	0.24 0.36 0.34 <u>0.21</u> 0.18 0.20	Report: T013971-05 Trial: CH-FR-06-0133
Vouvry, Switzerland (NEU)[a] 2006 Carrot / Dordogne	378 380 378	12 14	BBCH 41-42 BBCH 43-45 BBCH 45-47	-0 0 3 7 14 21	Roots	0.27 0.33 0.26 <u>0.41</u> 0.35 0.34	Report: T013971-05 Trial: CH-FR-06-0134

Location, Country Year, Crop/ Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Caudan, Switzerland (NEU) 2006 Carrot / Solo	379 379 373	13 11	BBCH 16 BBCH 19 BBCH 42	-0 0 3 6 14 21	Roots	0.18 0.19 0.21 <u>0.27</u> 0.24 0.04	Report: T013971-05 Trial: CH-FR-06-0135
Villamanrique de la Condesa, Spain (SEU) 2005 Carrot / Mocun	392 386 393	10 11	BBCH 46 BBCH 47 BBCH 47-48	-0 0 3 7 14 21	Roots	0.13 0.29 0.15 <u>0.18</u> 0.15 0.16	Report: 05-0403 Trial: AF/8555/SY/1
Lusia, Spain (SEU) 2005 Carrot / Nelson	379 377 383	10 13	BBCH 13-15 BBCH 19-41 BBCH 41	-0 0 3 7 14 21	Roots	0.25 0.26 0.19 <u>0.11</u> 0.08 0.09	Report: 05-0403 Trial: AF/8555/SY/2
Saucats, France (SEU) 2005 Carrot / Maestro	355 386 354	11 11	BBCH 47 BBCH 48 BBCH 49	-0 0 3 7 14 21	Roots	0.04 0.05 0.03 <u>0.04</u> 0.02 0.02	Report: 05-0606 Trial: FR-FR-05-0473
Bage Le Chatel, France (SEU) 2005 Carrot / Dematro	407 386 400	14 12	BBCH 16-41 BBCH 42-43 BBCH 43	-0 0 3 7 15 21	Roots	0.10 0.32 0.47 <u>0.50</u> 0.15 0.12	Report: 05-0611 Trial: FR-FR-05-0475
Villanueva de Duero, Spain (SEU) 2006 Carrot / Maestro	409 371 377	11 12	BBCH 47 - 77 BBCH 48 - 79 BBCH 49 - 55	-0 0 3 7 14 21	Roots	0.06 0.10 0.05 <u>0.06</u> 0.05 0.05	Report: T013972-05 Trial: ES-FR-06-0123
Chatun, Spain (SEU) 2006 Carrot / Maestro	396 386 390	13 13	BBCH 47 - 55 BBCH 49 - 55 BBCH 49 - 55	-0 0 3 8 13 23	Roots	0.11 0.13 0.08 0.13 <u>0.14</u> 0.13	Report: T013972-05 Trial: ES-FR-06-0301
Hourtin, France (SEU) 2006 Carrot / Solo	387 389 364	13 11	BBCH 43 BBCH 45 BBCH 47	-0 0 3 7 14 21	Roots	0.05 0.05 0.10 0.05 <u>0.08</u> 0.04	Report: T013972-05 Trial: ES-FR-06-0124
Cestas, France (SEU) 2006 Carrot / Solo	399 383 353	12 11	BBCH 43 BBCH 45 BBCH 48	-0 0 3 7 13	Roots	0.03 0.08 0.16 <u>0.09</u> 0.08	Report: T013972-05 Trial: ES-FR-06-0125

Location, Country Year, Crop/ Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Languedoc-Roissillon, France (SEU) 2009 Carrot / Chambord	312 295 302	14 14	BBCH 41-42 BBCH 43 BBCH 49	0 3 7 10 14	Roots	0.26 0.42 <u>0.68</u> 0.56 0.19	Report: S09-01528-REG Trial: S09-01528-01
Midi Pyrenees, France (SEU) 2009 Carrot / Maestro	323 311 313	14 14	BBCH 41-43 BBCH 43-45 BBCH 45-47	0 3 7 10 14	Roots	0.05 0.07 0.04 0.03 <u>0.08</u>	Report: S09-01528-REG Trial: S09-01528-02
Andalucia, Spain (SEU) 2009 Carrot / Maestro	306 312 316	7 14	BBCH 44 BBCH 45-46 BBCH 48-49	0 3 7 10 14	Roots	0.07 0.13 0.08 <u>0.12</u> 0.10	Report: S09-01528-REG Trial: S09-01528-03
Veneto, Italy (SEU) 2009 Carrot / Dondonia	290 312 301	14 14	BBCH 43 BBCH 45-46 BBCH 46-48	0 3 7 10 14	Roots	0.31 0.14 <u>0.08</u> 0.06 0.07	Report: S09-01528-REG Trial: S09-01528-04

[a] Trials regarded as independent trials based on dates of treatments and different crop varieties used

Potato

Sixteen supervised trials with cyprodinil on potato were conducted in the U.S.A in 2013. Four foliar applications were made at a nominal rate of 366 g ai/ha. In all trials the applications were made in the presence of an adjuvant (non-ionic surfactant or oil (petroleum based) or oil (vegetable based)).

At each trial site, duplicate trials were conducted using an EW and WG formulation. Residues were < 0.01 mg/kg in all cases at harvest.

Two of the trials (TK0147591-11 and TK0147591-15) were conducted at the same trial site in the same season. While different varieties of potato were tested, the planting dates were identical. These trials are regarded as replicates rather than independent trials. Thus there are a total of 15 trials.

Samples of potato were collected at normal commercial harvest, 13 to 14 days (7, 10, 14, 17 and 21/22 days in the decline trials) after application.

Samples were immediately frozen and maintained in frozen storage for periods of up to 464 days.

Residues of cyprodinil in potato were determined using analytical method GRM010.02A. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg and 0.1 mg/kg with recoveries in the range of 79.7–137%.

Table 14 Residues in Potatoes from supervised trials in the USA involving 4 foliar applications of cyprodinil

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	366 ai/ha × 4	7-10	Not stated	14	-	-	-
Lyons, New York, USA 2013 Potato / Reba	363 364 364 363	 7 7 7	BBCH 42 BBCH 44 BBCH 48 BBCH 49	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-01
	366 365 366 364	 7 7 7	BBCH 42 BBCH 44 BBCH 48 BBCH 49	14	Tuber	< 0.01, < 0.01 (< 0.01)	
North Rose, New York, USA 2013 Potato / NY118	374 372 371 374	 7 7 7	BBCH 43-45 BBCH 43-45 BBCH 45-47 BBCH 45-47	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-02
	365 367 365 372	 7 7 7	BBCH 43-45 BBCH 43-45 BBCH 45-47 BBCH 45-47	14	Tuber	< 0.01, < 0.01 (< 0.01)	
Seven Springs, North Carolina, USA 2013 Potato / Red Pontiac	362 364 373 362	 7 7 7	BBCH 42 BBCH 42 BBCH 45 BBCH 46	12	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-03
	361 357 373 368	 7 7 7	BBCH 42 BBCH 42 BBCH 45 BBCH 46	12	Tuber	< 0.01, < 0.01 (< 0.01)	
Oviedo, Florida, USA 2013 Potato / Red La Soda	362 365 368 370	 7 7 7	BBCH 43 BBCH 47 BBCH 47 BBCH 47	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-04
	368 365 365 367	 7 7 7	BBCH 43 BBCH 47 BBCH 47 BBCH 47	14	Tuber	< 0.01, < 0.01 (< 0.01)	
Richland, Iowa, USA 2013 Potato / Norland, Dark Red	370 367 368 366	 7 7 7	BBCH 43 BBCH 45 BBCH 47 BBCH 48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-05
	377 367 365 363	 7 7 7	BBCH 43 BBCH 45 BBCH 47 BBCH 48	7 10 14 17 21	Tuber	< 0.01 < 0.01 < 0.01, < 0.01 (< 0.01) < 0.01 < 0.01	
Verona, Wisconsin U.S.A (NAFTA region 5) 2013 Potato / Superior	365 362 372 374	 7 7 7	BBCH 64-66 BBCH 65-68 BBCH 69 BBCH 69	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-06
	375 374 371 370	 7 7 7	BBCH 64-66 BBCH 65-68 BBCH 69 BBCH 69	14	Tuber	< 0.01, < 0.01 (< 0.01)	
Northwood, North Dakota, U.S.A 2013 Potato / Red Pontiac	379 374 377 379	 7 7 7	BBCH 42-43 BBCH 43-44 BBCH 45-46 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-07
	362 363 363 358	 7 7 7	BBCH 42-43 BBCH 43-44 BBCH 45-46 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Gardner, North Dakota, U.S.A. 2013	392 381 380 403	 7 7 7	BBCH 47-48 BBCH 60-65 BBCH 75-80 BBCH 85-86	13	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-08
 Potato / Russet Norkotah	389 382 380 393	 7 7 7	BBCH 47-48 BBCH 60-65 BBCH 75-80 BBCH 85-86	13	Tuber	< 0.01, < 0.01 (< 0.01)	
Jerome, Idaho, U.S.A (NAFTA region 11) 2013	383 374 379 361	 7 7 7	BBCH 46-47 BBCH 46-47 BBCH 46-47 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-09
  Potato / Ranger Russet	372 368 372 368	 7 7 7	BBCH 46-47 BBCH 46-47 BBCH 46-47 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	
San Ardo, California, USA 2013	371 363 364 370	 7 7 7	BBCH 41 BBCH 43 BBCH 45-47 BBCH 47	13	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-10
  Potato / FL2048	375 373 377 368	 7 7 7	BBCH 41 BBCH 43 BBCH 45-47 BBCH 47	13	Tuber	< 0.01, < 0.01 (< 0.01)	
Payette, U.S.A. (NAFTA region 11, Idaho)[a] 2013	368 375 366 372	 7 7 7	BBCH 44-45 BBCH 45-46 BBCH 47 BBCH 47-48	7 10 14 17 22	Tuber	< 0.01 < 0.01 < 0.01, < 0.01 (< 0.01) < 0.01 < 0.01	Report: TK0147591 Trial: TK0147591-11
Potato / Russet Norkotah	367 373 367 357	 7 7 7	BBCH 44-45 BBCH 45-46 BBCH 47 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Replicate of trial TK0147591-15
Ephrate, Washington, U.S.A. 2013	372 367 372 366	 7 7 7	BBCH 47-48 BBCH 47-48 BBCH 48-49 BBCH 48-49	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-12
  Potato / Umatilla	370 371 366 364	 7 7 7	BBCH 47-48 BBCH 47-48 BBCH 48-49 BBCH 48-49	14	Tuber	< 0.01, < 0.01 (< 0.01)	
American Falls, Idaho, USA 2013	361 383 357 392	 7 7 7	BBCH 46-47 BBCH 46-47 BBCH 48-49 BBCH 48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-13
  Potato / Russet Burbank	392 377 371 371	 7 7 7	BBCH 46-47 BBCH 46-47 BBCH 48-49 BBCH 48	14	Tuber	< 0.01, < 0.01 (< 0.01)	
Aberden, Idaho, U.S.A 2013	368 372 364 366	 7 7 7	BBCH 45-46 BBCH 46-47 BBCH 47-48 BBCH 48	13	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-14
 Potato / Russet Burbank	366 368 364 367	 7 7 7	BBCH 45-46 BBCH 46-47 BBCH 47-48 BBCH 48	13	Tuber	< 0.01, < 0.01 (< 0.01)	
Payette, Idaho, USA[a] 2013	366 370 373 381	 7 7 7	BBCH 39-42 BBCH 43-44 BBCH 44-47 BBCH 47	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-15

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Potato / Dark Red Norland	370 370 375 372	 7 7 7	BBCH 39-42 BBCH 43-44 BBCH 44-47 BBCH 47	14	Tuber	< 0.01, < 0.01 (< 0.01)	
Rupert, Idaho, USA 2013	373 377 371 372	 7 7 7	BBCH 45-46 BBCH 46-47 BBCH 47-48 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	Report: TK0147591 Trial: TK0147591-16
Potato / Russet Burbank	370 375 377 368	 7 7 7	BBCH 45-46 BBCH 46-47 BBCH 47-48 BBCH 47-48	14	Tuber	< 0.01, < 0.01 (< 0.01)	

Values in parentheses = mean of multiple independent representative treated samples taken at the trial site

At each trial site duplicate trials conducted; 1st set of trials = WG formulation and 2nd set of trials = EW formulation

[a] Trials are replicate trials, residues in both trials were < 0.01 m/kg

Tree nuts (whole group except almond and pistachio)

Five supervised trials on pecan and five supervised trials on almond were conducted with cyprodinil in the USA in 2011. Four foliar applications were made at a nominal rate of 366 g ai/ha. The trials were conducted with an EW formulation and in the presence of an adjuvant (non-ionic surfactant or crop oil concentrate).

One of the trials (TK0108966) was conducted with six applications and therefore does not reflect the GAP.

Samples of pecan and almond nutmeat were collected at normal commercial harvest, 13 - 14 days after application and in one decline trial on almond at 0, 5, 9, 14 and 19 days after application. The GAP authorised in the USA has a PHI of 14 days for tree nuts except for almonds which has a PHI of 60 days and for pistachio which has a PHI of 7 days.

Samples of nutmeats were immediately frozen and maintained in frozen storage for periods of up to 300 days.

Residues of cyprodinil in pecan and almond were determined using analytical method GRM010.02A. Procedural recoveries were conducted at fortification levels of 0.01 mg/kg and 0.1 mg/kg with recoveries in the range of 74–97%.

Table 15 Residues in Tree nuts from supervised trials in the USA involving 4 foliar applications of cyprodinil (6 applications in one trial)

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	366 g ai/ha × 4	14	Not stated	14	-	-	-
Chula, Georgia, USA 2011 Pecan/ summer	362 370 367 369	13 14 13	BBCH 80 BBCH 80 BBCH 81 BBCH 85	14	Nutmeat	< 0.01, 0.041 (0.026)	Report: TK0108966 Trial: TK0059529-01

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Pineview, Georgia, USA 2011 Pecan/ Desireable	371 369 371 373	15 13 13	BBCH 80 BBCH 83 BBCH 85 BBCH 85	13	Nutmeat	0.011, < 0.01 (0.01)	Report: TK0108966 Trial: TK0059529-02
Alexandria, Louisiana, USA 2011 Pecan/ Creek	373 367 371 371	14 14 13	BBCH 85 BBCH 85-88 BBCH 85-88 BBCH 93	13	Nutmeat	0.012, < 0.01 (0.011)	Report: TK0108966 Trial: TK0059529-03
Madill, Oklahoma, USA 2011 Pecan/ Wichite	370 355 362 367	14 14 15	BBCH 80 BBCH 85 BBCH 89 BBCH 93	13	Nutmeat	< 0.01, < 0.01 (< 0.01)	Report: TK0108966 Trial: TK0059529-04
Altus, Oklahoma, USA 2011 Pecan/ Wichite	371 361 368 362	14 15 12	BBCH 79 BBCH 85 BBCH 89 BBCH 93	14	Nutmeat	< 0.01, < 0.01 (< 0.01)	Report: TK0108966 Trial: TK0059529-05
Madera, California, USA 2011 Almond/ Monterrey	365 373 369 372 370 370	14 14 14 15 13	BBCH 79 BBCH 79 BBCH 79 BBCH 79 2-5% hull split 5-10% hull split	14 14	Nutmeat	0.037, 0.021 (0.029)	Report: TK0108966 Trial: TK0059529-06
Strathmore, California, USA 2011 Almond/ Carmel	370 370 371 370	14 14 14	BBCH 79 BBCH 79 BBCH 79 BBCH 89	14 14	Nutmeat	0.012, 0.011 (0.012)	Report: TK0108966 Trial: TK0059529-07
Chico , California, USA 2011 Almond/ Price	371 371 371 370	14 14 14	not reported	14 14	Nutmeat	< 0.01, < 0.01 (< 0.01)	Report: TK0108966 Trial: TK0059529-08
Dinuba, California, USA 2011 Almond/ Carmel	368 367 369 369	14 14 14	BBCH 79 BBCH 79 BBCH 79 BBCH 79	14 14	Nutmeat	< 0.01, < 0.01 (< 0.01)	Report: TK0108966 Trial: TK0059529-09

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
Madera, California, USA 2011 Almond/ Pareil	379 374 373 371	14 14 14	BBCH 79 BBCH 79 BBCH 81 BBCH 81	0 5 9 14 19	Nutmeat	0.024 0.024 0.017 0.012, 0.015 (0.014) < 0.01	Report: TK0108966 Trial: TK0059529-10

Values in parentheses = mean of two independent representative treated samples taken at the trial site

Pistachio

Three supervised trials on pistachio were conducted with cyprodinil in the USA in 1999. Four foliar applications were made at a nominal rate of 368 g ai/ha. The trials were conducted with a WG formulation.

Samples of pistachio were collected at normal commercial harvest, 7 days after application.

Samples were immediately frozen and maintained in frozen storage for periods of up to 211 days.

Residues of cyprodinil in pistachio were determined using analytical method AG-631A. Procedural recoveries were conducted at fortification levels of 0.02 mg/kg, 0.05 mg/kg and 0.5 mg/kg with recoveries in the range of 72–112%.

Table 16 Residues in Pistachio from supervised trials in the USA involving 4 foliar applications of cyprodinil

Location, Country Year, Crop/Variety	Rate (g ai/ha)	Interval (days)	Growth stage at application	DALA (days)	Crop part	Cyprodinil (mg/kg)	Reference
GAP USA	368 g ai/ha × 4	14	Not stated	7	-	-	-
Kerman, California, USA 1999 Pistachio/Kerman	364 364 370 371	14 14 14	Fruiting Fruiting Fruiting Maturing nuts	7	Nutmeat	0.0418, 0.0271 (0.035)	Report: TK0108966 Trial: 99-CA76
Madera, California, USA 1999 Pistachio, Kerman	370 370 364 369	14 14 14	Green nuts Fruiting Fruiting Maturing nuts	7	Nutmeat	0.0199, 0.0322 (0.026)	Report: TK0108966 Trial: 99-CA77
Madera, California, USA 1999 Pistachio/Kerman	369 369 364 364	14 14 14	Fruiting Fruiting Fruiting Maturing nuts	7	Nutmeat	< 0.02, < 0.02 (< 0.02)	Report: TK0108966 Trial: 99-CA78

Values in parentheses = mean of two independent representative treated samples taken at the trial site

Animal feeds

The meeting received data for almond hulls. These data did not comply with the GAP and were not taken into consideration.

FATE OF RESIDUES DURING PROCESSING

In processing-effect on the residue level

The fate of cyprodinil residues on processing was evaluated by the JMPR in 2003, 2013 and 2015 where the processing of residues in various crops was evaluated and where applicable processing factors were established. For the current meeting information was received on the fate of cyprodinil residues on the processing of carrots and potatoes.

Carrots

One trial (Sole C., 2007, T00181-06-REG) was conducted on carrot in France in 2006. Three foliar applications of a WG formulation at a nominal rate of 1100 g ai/ha were made. Carrot root samples were collected 6 days after the last treatment and were processed into canned carrots, juice, cooked carrots and bagged carrots. Four processing trials were conducted for each process.

Untreated and treated samples of carrots (9–11 kg) were received refrigerated (2–9 °C) at the processing facility. The carrot samples were stored refrigerated (5–10 °C) for three days and divided into sub-samples as required for the different processes.

Relevant industrial practices and standardised procedures were applied to simulate the common processes used by industry for juicing and canning (preserving). Normal domestic practices were followed for cooking and bagging the carrots.

Processing of canned carrots

The untrimmed carrots were peeled by abrasion and washed with a water flow of 10–12 L/minute. Aliquots of peels and washing water were taken for analysis. The peeled and washed carrot roots were blanched in boiling water (1 L per kg of carrot) for approximately one minute and placed into jars. A brine solution was prepared using 30 g of salt per litre of water and the pH was adjusted to 3.4 by addition of citric acid. Blanched carrots and brine (ratio 2:1) were placed in cans and the cans were sterilized at 115–120 °C for 10 minutes. Cans were stored frozen until analysis.

Juice production

The untrimmed carrots were peeled by abrasion and washed with a water flow of 10–12 L/minute. Aliquots of peels and washing water were taken for analysis. The peeled and washed carrots, whole or cut into several pieces, were introduced into the juice extractor to separate the juice from the pulp on a spinning sieve. When required, the raw juice was adjusted to a pH of approximately 3.5 using citric acid and pasteurized by treatment at approximately 85 °C for about one minute. The juice was transferred into glass jars and stored frozen until analysis.

Processing of cooked carrots

The carrots were trimmed by cutting off the two ends and peeled with a knife. Aliquots of peels were taken for analysis. The peeled carrots were washed with water and strained. The trimmed and washed carrots were cooked in boiling water (1 L tap water per 1 kg of carrot) for approximately 15 minutes.

Cooked carrots were sampled and stored frozen until analysis.

Processing of vacuum bagged carrots

The carrots were trimmed by cutting off the two ends and peeled with a knife. Aliquots of peels were taken for analysis. The trimmed and peeled carrots were washed in chlorinated water (50 mg/L chlorine) by immersion for 10 minutes. The procedure was repeated three times with unchlorinated water. The carrots were packed in plastic bags under vacuum and stored frozen until analysis.

The processed fractions were stored for a maximum period of 272 days. All samples were analysed for residues of cyprodinil using method REM 141.10. This method has been validated for a

range of high water crops. Procedural recovery data were generated for the processed fractions at 0.01–1 mg/kg with recoveries in the range of 72–110% obtained.

The residues in the treated carrot processed commodities as well as the processing factors are presented in table 17.

Table 17 Residues of cyprodinil in carrot roots and processed fractions

Trial	Process	Commodity	Residue of cyprodinil (mg/kg)	Processing Factor (PF) [a]
FR-FR-06-0080B		Carrot (RAC)	0.19 [b]	—
	Canning	Waste (peels)	0.23	1.2
		Carrots (washed and peeled)	0.06	0.32
		Carrots (blanched)	0.05	0.26
		Carrots (canned)	0.03	0.16
	Juicing	Carrot (RAC)	0.18 [b]	—
		Waste (peels)	0.25	1.4
		Carrots (washed and peeled)	0.09	0.50
		Pulp	0.09	0.50
		Juice (raw)	0.04	0.22
		Juice (pasteurized)	0.03	0.17
	Cooking	Carrot (RAC)	0.15 [b]	—
		Waste (peels)	0.43	2.9
		Carrots (peeled)	0.05	0.33
		Carrots (washed and peeled)	0.04	0.27
		Carrots (cooked)	< 0.01	< 0.07
	Bagging	Carrot (RAC)	0.27 [b]	—
		Waste (peels)	0.59	2.2
		Carrots (peeled)	0.04	0.15
		Carrots (washed and peeled)	0.03	0.11
		Carrots (bagged)	0.01	0.04
FR-FR-06-0080F1	Canning	Carrot (RAC)	0.19 [b]	—
		Carrots (canned)	0.04	0.21
	Juicing	Carrot (RAC)	0.18 [b]	—
		Juice (pasteurized)	0.04	0.22
	Cooking	Carrot (RAC)	0.15 [b]	—
		Carrots (cooked)	0.01	0.07
	Bagging	Carrot (RAC)	0.27 [b]	—
		Carrots (bagged)	0.01	0.04
FR-FR-06-0080F2	Canning	Carrot (RAC)	0.19 [b]	—
		Carrots (canned)	0.03	0.16
	Juicing	Carrot (RAC)	0.18 [b]	—
		Juice (pasteurized)	0.03	0.17
	Cooking	Carrot (RAC)	0.15 [b]	—
		Carrots (cooked)	0.01	0.07
	Bagging	Carrot (RAC)	0.27 [b]	—
		Carrots (bagged)	0.01	0.04
FR-FR-06-0080F3	Canning	Carrot (RAC)	0.19 [b]	—
		Carrots (canned)	0.05	0.26
	Juicing	Carrot (RAC)	0.18 [b]	—
		Juice (pasteurized)	0.06	0.33
	Cooking	Carrot (RAC)	0.15 [b]	—
		Carrots (cooked)	0.02	0.13
	Bagging	Carrot (RAC)	0.27 [b]	—
		Carrots (bagged)	0.02	0.07
Peeled carrot (median PF)				0.30
Carrot peels (median PF)				1.8
Canned carrot (median PF)				0.19
Carrot juice (Pasteurized) (median PF)				0.20
Cooked carrot (median PF)				0.07

Trial	Process	Commodity	Residue of cyprodinil (mg/kg)	Processing Factor (PF) [a]
Bagged carrot (median PF)				0.04

RAC = raw agricultural commodity

[a] Processing factor = residue in processed commodity (mg/kg) / residue in RAC (mg/kg)

[b] Mean of two samples analysed

Potatoes

Two trials (McDonald., 2015, TK0147591-08 and TK0147591-12) were conducted on potato in the USA in 2013. Four foliar applications of a WG or EW formulation at a rate of 1818–1942 g ai/ha were made. Potato tubers were collected 14 days after harvest and were processed into granules/flakes, crisps (chips), wet peel and chips (French fries). Only one processing trial was conducted from each of the trials.

Untreated and treated samples (36.8 kg) of potatoes were stored at ambient temperature in the dark. Once processing had started samples were stored frozen prior to analysis.

Relevant industrial practices and standardised procedures were applied to simulate the common processes used by industry. Potatoes were cleaned prior to processing; potatoes were soaked in warm water for 5–10 minutes and then brushed and rinsed to remove foreign material.

Skin removal (peeling)

Cleaned potatoes were peeled with the water being removed using a hydraulic press. Peeled potatoes were inspected and any green or bruised spots removed. Wet peel fractions were collected and placed into frozen storage.

Flake production

Peeled potatoes were sliced into slabs and washed with cold water. The slabs were then cooked in water (71–74 °C) for 19–21 minutes. The potatoes were then cooled and the water drained. The potato slabs were then steamed for 15 minutes at 94–100 °C). The cooked potatoes were then flash dried with a steam heated drum dryer. The resulting product was collected as potato flakes and placed in frozen storage prior to analysis.

Potato crisps (chips)

Peeled potatoes were sliced to a thickness of 1.1–1.7 mm and rinsed twice with water. Slices were balanced in water (82–90 °C) for 30 seconds to 2 minutes and then removed and allowed to dry for around 1 -2 minutes. Slices were backed in a commercial conveyor baking oven. The chips were allowed to cool before collection and frozen prior to analysis.

Peel –on frozen French fries

Cleaned potatoes were sliced with a French fry cutter and then balanced in water (82–90 °C) for 2 minutes. After the removal of water, excess water was removed from the blanched French fries. The fries were then fired at 174–193 °C in oil for 1 minute. Following frying, excess oil was allowed to drain from the fries. The fries were then placed directly on trays under blowers in a frozen environment for 40–50 minutes. The fries were then place din frozen storage for analysis.

The residues in the treated potato processed commodities as well as the processing factors are presented in table 18.

Table 18 Residues of cyprodinil in potato tubers and processed fractions

Trial	Process	Residue of cyprodinil (mg/kg)	Processing Factor (PF) [a]
TK0147591-08	Tuber (RAC)	0.029, 0.021, 0.056 (0.035) [b]	-
	Granules/flakes	< 0.01	<0.29
	Crisps (chips)	< 0.01	<0.29
	Wet peel	0.118	3.37
	Chips (French fries)	< 0.01	<0.29
TK0147591-12	Tubers (RAC)	< 0.01, 0.011 (0.0105)	-
	Granules/flakes	< 0.01	<0.95
	Crisps (chips)	< 0.01	<0.95
	Wet peel	0.015	1.43
	Chips (French fries)	< 0.01	<0.95
Granules/flakes (median PF)			0.62
Crisps (chips) (median PF)			0.62
Wet peel (median PF)			2.4
Chips (French fries) (median PF)			0.62

RAC = raw agricultural commodity

[a] Processing factor = residue in processed commodity (mg/kg) / residue in RAC (mg/kg). Where residue was < 0.01 mg/kg it has been assumed to be 0.01 mg/kg.

[b] Mean of multiple samples analysed

APPRAISAL

Cyprodinil was firstly evaluated by JMPR in 2003, when an ADI of 0–0.03 mg/kg bw/day was established. The meeting decided that an ARfD was unnecessary. The residue definition for both plants and animal commodities, for both compliance with MRLs and estimation of dietary intakes, is defined as cyprodinil. The residue is fat soluble.

In 2013 and 2015 the JMPR evaluated additional uses for cyprodinil on multiple crops.

At the forty-seventh session of the CCPR (2015), cyprodinil was scheduled for evaluation of additional use patterns by the 2017 JMPR. The current meeting received residue data for artichoke (globe), carrots, celery, fresh beans with pods, guava, pomegranate, potato, almonds, pecan and pistachio.

Methods of analysis

Residues were determined in the crops using several different analytical methods, some of which have been considered previously by the JMPR. In general the data generation methods involved the extraction with methanol/water or acetonitrile/water with a final determination using LC-MS/MS. An LOQ of 0.01 mg/kg was supported for cyprodinil. The meeting concluded that suitable methods are available for the determination of cyprodinil in the crops under consideration.

Stability of residues in stored analytical samples

Data have previously been evaluated by the JMPR for crops of a high water content, high starch content and high oil content. The meeting concluded that these data supported the length of storage in the residue trials.

In this meeting stability data were provided for guava (which showed stability for at least 657 days), pomegranate (which showed stability for at least 302 days) and artichoke (which showed

stability for at least 247 days). These data are consistent with the stability data assessed previously by the JMPR and the meeting concluded the data support the length of storage in the trials.

Results of supervised residue trials on crops

The meeting received residue trials data for cyprodinil on artichoke, carrots, celery, fresh beans with pods, guava, pomegranate, potato, almond, pecan and pistachio.

Guava

The critical GAP is for the USA which is four applications at 368 g ai/ha with a PHI of 0 days. Four residue trials support the GAP for guava in the USA. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residues in guava in rank order (n=4) were: 0.37, 0.48, 0.49, and 0.52 mg/kg.

The meeting estimated a maximum residue level of 1.5 mg/kg and an STMR of 0.485 mg/kg for guava.

Pomegranate

The critical GAP is for the USA which is a post-harvest dip/drench treatment at 54 g ai/hL. One application is made before storage and one application is made before trading. The PHI is 0 days. Crop samples were collected prior to treatment from known trial sites. The post-harvest treatments were conducted at the same test facility on different dates using different dip/drench solutions. Four residue trials support the GAP for pomegranate in the USA. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residues in pomegranate in rank order (n=4) were: 2.6, 3.3, 3.3, and 3.4 mg/kg

The meeting estimated a maximum residue level of 10 (Po) mg/kg and an STMR of 3.30 mg/kg for pomegranate.

Beans with pods

The critical GAP is for Spain which is a protected use of two applications at 375 g ai/ha with a PHI of 3 days. Nine residue trials conducted at a rate of 375 g ai/ha with three applications were provided.

The trials do not reflect the GAP. However, the meeting concluded that the decline observed on consideration of all the trials demonstrated that the first application had a minimal impact on the final residue and the data were sufficient to establish a maximum residue level and STMR.

Residues in beans with pods in rank order (n = 9) were: 0.34, 0.47, 0.54, 0.58, 0.60, 0.61, 0.75, 0.83, and 1.2 mg/kg.

The meeting estimated a maximum residue level of 2 mg/kg and an STMR of 0.60 mg/kg for the subgroup beans with pods

These recommendations replace the previous recommendations of a maximum residue level of 0.7 mg/kg and an STMR of 0.165 mg/kg for beans with pods (*Phaseolus* spp.).

Artichoke, Globe

The critical GAP is for the USA which is four applications at 366 g ai/ha with a PHI of 3 days. Four residue trials were provided. Three of the trials reflect the GAP in the USA. In a fourth trial, five applications were made. The total application rate in the trial with five applications supports the GAP and the residue obtained is comparable to the residue levels obtained with four applications. Therefore the meeting agreed that the first application had a minimal impact on the final residue and the trial with five applications can be regarded as supporting the GAP. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residues in globe artichoke in rank order (n=4) were: 0.93, 1.1, 1.3, and 1.3 mg/kg

The meeting estimated a maximum residue level of 4 mg/kg and an STMR of 1.20 mg/kg for globe artichoke.

Celery

The critical GAP is for the USA which is four applications at 368 g ai/ha with a PHI of 0 days. Eight residue trials support the GAP for celery in the USA. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residues in celery in rank order (n=8) were: 3.5, 3.6, 5.9, 7.2, 9.7, 11, 12, and 16 mg/kg.

The meeting estimated a maximum residue level of 30 mg/kg and an STMR of 8.45 mg/kg for celery.

Carrot

The critical GAP is for Germany which is three applications at 375 g ai/ha with a PHI of 7 days. Twenty residue trials support the GAP for carrot in Germany. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residue in carrot in rank order (n=20) were: 0.04, 0.06, 0.08 (3), 0.09, 0.11, 0.12, 0.14, 0.18, 0.21, 0.27, 0.33, 0.41, 0.48, 0.50, 0.51, 0.53, 0.68, and 1.0 mg/kg.

The meeting estimated a maximum residue level of 1.5 mg/kg and an STMR of 0.195 mg/kg for carrot.

These recommendations replace the previous recommendations of a maximum residue level of 0.7 mg/kg and an STMR of 0.09 mg/kg for carrot.

Potato

The critical GAP is for the USA which is four applications at 366 g ai/ha with a PHI of 14 days. Fifteen residue trials support the GAP for potato in the USA. The meeting concluded that the data were sufficient to establish a maximum residue level and an STMR.

Residues in potato (n=15) were < 0.01 mg/kg

The meeting estimated a maximum residue level of 0.01* mg/kg and an STMR of 0.01 mg/kg for potato.

Tree nuts (except almond and pistachio)

The critical GAP for tree nuts (except almond and pistachio) is for the USA which is four applications at 366 g ai/ha with a PHI of 14 days.

Ten residue trials were provided (five trials on almond and five trials on pecan).

The five trials for pecan support the GAP in the USA.

Residues in pecan in rank order (n=5) were: < 0.01 (2), < 0.0.010, 0.011, and 0.026 mg/kg

For almond four of the five trials support the GAP in the USA. In a fifth trial six applications were made.

Residues in almond in rank order (n=4) were: < 0.01 (2), < 0.0.012, 0.014 mg/kg

Almond is regarded as a representative crop for tree nuts and the trials conducted on almonds and pecan both reflect the critical GAP in the USA for tree nuts (except almond and pistachio). The two data sets are similar. The meeting concluded that the combined data were sufficient to extrapolate to tree nuts (except almond and pistachio) and to establish a maximum residue level and an STMR.

Residues in tree nuts, for the combined data set, in rank order (n=9) were < 0.01 (4), 0.01, 0.011, 0.012, 0.014, and 0.026 mg/kg

The meeting estimated a maximum residue level of 0.04 mg/kg and an STMR of 0.01 mg/kg for tree nuts (except almond and pistachio).

Pistachio

The critical GAP for pistachio is for the USA which is four applications at 368 g ai/ha with a PHI of 7 days. Three residue trials support the GAP for pistachio in the USA.

Residues in pistachio in rank order (n= 3) were < 0.02, 0.026, and 0.035 mg/kg

The meeting concluded that the data were insufficient to establish a maximum residue level and STMR.

Animal feedstuffs

The meeting received data for almond hulls. These data did not comply with the GAP and were not considered for maximum residue level or animal dietary burden estimation.

Fate of residues during processing

The fate of cyprodinil residues on processing was evaluated by the JMPR in 2003, 2013 and 2015 where the processing of residues in various crops was evaluated and where applicable processing factors were established.

For the current meeting information was received on the fate of cyprodinil residues on the processing of carrots and potatoes. A summary of the relevant cyprodinil processing factors are provided below.

Raw commodity	**Processed fraction**	**Individual processing factors (PF)**	**Mean or best estimate processing factor (PF)**	**STMR-P = STMR × PF (mg/kg)**
Carrot	Canned	0.16, 0.16, 0.21, 0.26	0.20	0.039
	Juice (pasteurised)	0.17, 0.17, 0.22, 0.33	0.22	0.043
	Carrot Peel	1.2, 1.4. 2.2, 2.9	1.9	-
	Cooked/boiled (without peel)	0.07, 0.07, 0.07, 0.13	0.085	-
	Cooked/boiled (with peel)	0.26	0.26	0.051
Potato	Dried (granules/flakes)	< 0.29, < 0.95	0.62	< 0.01
	Crisps	< 0.29, < 0.95	0.62	< 0.01
	Deep-fried (chips/French fries without peel)	< 0.29, < 0.95	0.62	< 0.01

Residues in animal commodities

Carrots and potatoes can be fed to livestock.

Dietary burden calculations incorporating these commodities and those considered by the JMPR in 2003, 2013 and 2015 have been undertaken for beef cattle, dairy cattle poultry (broiler) and poultry (layer). The calculations were made for the dietary burdens for each geographic region (USA/Canada, Europe, Australia and Japan) using the OECD diets listed in Appendix IX of the 2016 edition of the FAO Manual.

The additional contribution to the dietary burden using the estimated median and highest residue levels is less than 10% of the total and the meeting confirmed the previous recommendations of maximum residue levels in animal products.

RECOMMENDATIONS

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

CCN	Commodity name	Recommended maximum residue level, mg/kg		STMR or STMR-P, mg/kg	HR or HR-P, mg/kg
		New	Previous		
VS 0620	Artichoke, globe	4	-	1.20	-
VR 0577	Carrot	1.5	0.7	0.195	-
VS 0624	Celery	30	-	8.45	-
FT 0336	Guava	1.5	-	0.485	-
FI 0355	Pomegranate	10 (Po)	-	3.30	-
VP 2060	Subgroup of Beans with pods	2	-	0.60	-
VP 0061	Beans with pods (*Phaseolus* spp.)	W	0.7		-
VR 0589	Potato	0.01*	-	0.01	-
TN 0085	Tree nuts (except almond and pistachio)	0.04	-	0.01	-

DIETARY RISK ASSESSMENT

Long-term dietary exposure

The International Estimated Dietary Intakes (IEDIs) of cyprodinil were calculated for the 17 GEMS/food cluster diets using STMRs/STMR-Ps estimated by the current Meeting and by the JMPR in 2003, 2013 and 2015. The ADI is 0–0.03 mg/kg bw and the calculated IEDIs were 8–70% of the maximum ADI (0.03 mg/kg bw). The Meeting concluded that the long-term dietary exposure to residues of cyprodinil resulting from the uses considered by the current Meeting and by the JMPR in 2003, 2013 and 2015, is unlikely to present a public health concern.

Short-term dietary exposure

The 2003 JMPR decided that an ARfD was unnecessary and concluded that the short-term dietary exposure to residues of cyprodinil is unlikely to present a public health concern.

REFERENCES

Author	Report No./Trial ID	Year	Title, Institute
Lin K., Manuli M.E.	GRM010.02A	2011	Analytical Method for the Determination of Cyprodinil on Crops and Tree Nuts by LC-MS/MS. Syngenta Method Number GRM010.02A, Syngenta File No. CGA219417_50141
Lin K.	TK0021500	2011	Validation of Analytical Method GRM010.02A for the Determination of Residues of Cyprodinil in Crops and Tree Nuts by LC-MS/MS. Syngenta Report Number TK0021500, Syngenta File No. CGA219417_50142
Asekunowo J.	P 3866 G	2015	Cyprodinil - Independent Laboratory Validation of GRM010.02A Method for the Determination of Residues of Cyprodinil in Crop Matrices by LC-MS/MS. Syngenta Report Number P 3866 G, Syngenta File No. CGA219417_11672
MacDonald, T.J.	TK0147591	2015	Cyprodinil - Cyprodinil EW (A16001A) and Cyprodinil WG (A9219B) – Magnitude of the Residues in or on Potato, USA 2013; Syngenta File No. A16001A_50067; Syngenta Report No. TK0147591
Mazlo, J.	TK0108966	2013	Difenoconazole/Cyprodinil EW (A16001A) – Magnitude of the Residues of Cyprodinil in or on Almonds and Pecans as Representative Commodities of Tree Nuts, Group 14 - USA 2012; Syngenta File No. A16001A_50050; Syngenta Report No. TK0108966

Author	Report No./Trial ID	Year	Title, Institute
Chaggar, S.	REM 141.10	2005	Chaggar, S (2005): Residue method for the determination of residues of cyprodinil (CGA219417) in crops. Final determination by LC-MS/MS. Syngenta Method Reference: REM 141.10; Syngenta File No: CGA219417/1278
Chaggar, S.	RJ3583B	2005	Chaggar, S (2005a): Cyprodinil (CGA219417): Validation of analytical method REM 141.10 for the determination of residues in crops. Final determination by LC-MS/MS. Syngenta Report No: RJ3583B; Syngenta File No: CGA219417/1277
Leonard R.C.	07127	2013	Cyprodinil + Fludioxonil: Magnitude of the Residue on Guava; Syngenta File No. A9219B_50036; IR-4 PR No. 07127
Leonard R.C.	10613	2013	Cyprodinil + Fludioxonil: Magnitude of the Residue on Pomegranate (Post Harvest); Syngenta File No. A9219B_50045; IR-4 PR No. 10613
Gillis, N.	AF/7741/FX	2005	To determine the magnitude of cyprodinil and fludioxonil residues at intervals in the raw agricultural commodity protected French beans resulting from sequential overall applications of A9219 B, in Spain (2004-2005); Syngenta File No. CGA173506/7003; Syngenta Report No. AF/7741/FX
Pointurier, R.	04-0411	2005	Cyprodinil (CGA219417) and Fludioxonil (CGA173506): Residue Study in or on Protected Fresh Beans with Pods in Spain; Syngenta File No. CGA173506/6303; Syngenta Report No. 04-0411
Corley, J.	10387	2012	Difenoconazole + Cyprodinil: Magnitude of the Residue on Artichoke; Syngenta File No. A16001A_50051; IR-4 PR No. 10387
Hampton, R.E.	T008508-08	2011	Cyprodinil/Fludioxonil WG (A9219B) –Magnitude of the Residues in or on Celery, Representative Commodity, Crop Group 4B (Final Report Amendment); Syngenta File No. A9219B_50016; Syngenta Report No. T008508-08
Bour, D.	05-0402	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in France (North); Syngenta File No. CGA173506/7076; Syngenta Report No. 05-0402
Bour, D.	05-0605	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots northern France; Syngenta Report No. 05-0605
Bour, D.	05-0610	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in northern France; Syngenta File No. CGA219417_10689; Syngenta Report No. 05-0610
Sole, C.	T001818-06-REG	2007	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots and processed fractions in northern France in 2006; Syngenta File No. CGA219417_10675; Syngenta Report No. T001818-06-REG
Royer, A.	T013971-05	2007	Cyprodinil (CGA219417) and Fudioxonil (CGA173506) - Residue study on carrots in Switzerland and northern France in 2006; Syngenta File No. CGA219417_10674; Syngenta Report No. T013971-05
Bour, D.	05-0403	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in Italy and Spain; Syngenta File No. CGA173506/7048; Syngenta Report No. 05-0403
Bour, D.	05-0606	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in Southern France; Syngenta File No. CGA173506/7075; Syngenta Report No. 05-0606
Bour, D.	05-0611	2006	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in Southern France; Syngenta File No. CGA173506/7049; Syngenta Report No. 05-0611
Royer, A.	T013972-05	2007	Cyprodinil (CGA219417) and fludioxonil (CGA173506) - Residue study on carrots in southern France and Spain in 2006; Syngenta File No. CGA173506/7229; Syngenta Report No. T013972-05
Tessier, V.	S09-01528-REG	2011	Isopyrazam and Cyprodinil - Residue study on Carrots in southern France; Spain and Italy in 2009; Syngenta File No. A16934C_10008; Syngenta Report No. S09-01528-REG
MacDonald, T.J.	TK0147591	2015	Cyprodinil - Cyprodinil EW (A16001A) and Cyprodinil WG (A9219B) – Magnitude of the Residues in or on Potato, USA 2013; Syngenta File No. A16001A_50067; Syngenta Report No. TK0147591
Mazlo, J.	TK0108966	2013	Difenoconazole/Cyprodinil EW (A16001A) – Magnitude of the Residues of Cyprodinil in or on Almonds and Pecans as Representative Commodities of Tree Nuts, Group 14 - USA 2012; Syngenta File No. A16001A_50050; Syngenta Report No. TK0108966
Thompson, D.C.	07336	2001	Cyprodinil and fludioxonil: Magnitude of the residue on pistachio; IR-4 study No. 07336