

BOSCALID (221)

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EXPLANATION

Boscalid is a systemic fungicide first evaluated by JMPR in 2006 for residues and toxicology as a new active substance. An ADI of 0–0.04 mg/kg bw was established for boscalid, while no ARfD was considered necessary.

The 2006 JMPR recommended the following residue definition for boscalid:

Definition of the residue for compliance with the MRL in plant and animal commodities and for dietary risk assessment in plant commodities: *boscalid*.

Definition of the residue for dietary risk assessment in animal commodities: *sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide (M510F01) including its conjugate, expressed as boscalid*.

The residue is fat-soluble.

In 2008 and 2010 additional uses (and in 2009 residues in follow crops) were reviewed for residues by the Meeting. Boscalid was scheduled at the Fiftieth Session of the CCPR for the evaluation of additional uses by the Extra 2019 JMPR Meeting. The current Meeting received new information on use patterns for boscalid in pome fruit, stone fruit, berry fruit, tropical fruit and tea supported by additional plant and animal metabolism studies, analytical methods and recovery data, supervised field trials and studies simulating typical processing conditions.

METABOLISM AND ENVIRONMENTAL FATE

Metabolism studies were conducted using [pyridin-3-¹⁴C]-boscalid (pyridin-label) and [diphenyl-¹⁴C]-boscalid (diphenyl-label). The position of the label for both substances is presented in the following figures:

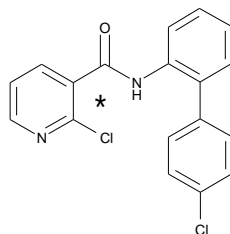


Figure 1 [pyridin-3-¹⁴C]-boscalid

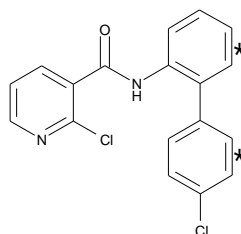
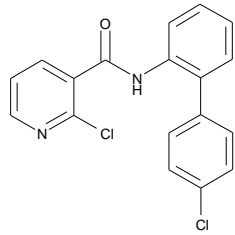
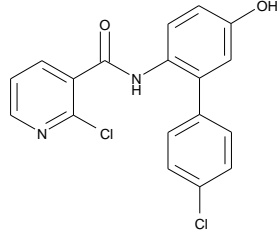
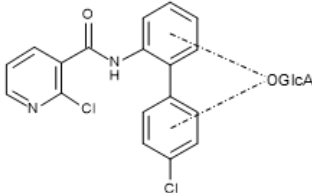


Figure 2 [diphenyl-¹⁴C]-boscalid

Chemical names, structures and code names of metabolites and degradation products of boscalid discussed within this document are shown below. For a complete list of metabolites, please refer to the 2006 JMPR evaluation report.

Table 1 Metabolites of boscalid discussed within this document

Code Names	Structure	Where found
Boscalid BAS510F		Rat, plants, animals, rotational crops, soil
M510F01		Rat, animals
M510F65		Rat, animals

Plant metabolism

The Meeting received a new plant metabolism study with boscalid on green beans. In all samples, only unchanged boscalid was identified.

Green beans

The metabolic fate of ^{14}C -diphenyl-boscalid in beans was investigated by Schaffert D. (2017, BOSC19E_002). Beans were seeded in containers and treated by three foliar application at BBCH 61 (beginning of flowering), 11 days later and finally 13 days before harvest, each conducted at a rate of 0.52 kg ai/ha. Samples of plants and whole pods were collected 3 days before and 13 days after final treatment. Pods collected at harvest were also separated into hulls and seeds.

Total radioactive residues (TRR) were analysed following combustion by means of an oxidizer. For the quantitation of radioactive residues in liquid samples a liquid scintillation counter (LSC) was used. All samples were extracted three times with methanol and two times with water. After each extraction step, solid material was separated from the extract by centrifugation and filtration. The filtered supernatants (methanol extracts and water extracts) were pooled and aliquots thereof were radioassayed. The residue after solvent extraction was dried, homogenized, and aliquots thereof were radioassayed.

The combined extracts were diluted with methanol or directly analysed by HPLC-LSC. All samples were analysed within 6 months.

TRR levels found were highest in the plants, followed by pods/hulls and seeds (Table 2). The solvent extraction using methanol and water release more than 98% of the TRR for all matrices except seeds, for which only 70.2% TRR could be extracted.

Table 2 Total radioactivity in bean matrices following application of ^{14}C -diphenyl-boscalid ($3 \times 0.52 \text{ kg ai/ha}$)

Matrix	TRR measured by combustion in mg eq/kg	TRR calculated from extracts in mg eq/kg
Pods (DALA -3)	1.02	1.2
Plant (DALA -3)	28.8	29.2
Pods (DALA 13)	0.757	0.789
Hulls (DALA 13)	0.833	0.802
Seeds (DALA 13)	0.066	0.065
Plant (DALA 13)	49.4	52.1

The identification of the radioactivity revealed only unchanged parent boscalid in all plant matrices.

Table 3 Identification of radioactivity in bean matrices following application of ^{14}C -diphenyl-boscalid ($3 \times 0.52 \text{ kg ai/ha}$)

Compound	% TRR (mg eq/kg)					
	Pods (-3 DALA)	Plant (-3 DALA)	Pods (13 DALA)	Hulls (13 DALA)	Seeds (13 DALA)	Plant (13 DALA)
Methanol extract	98.9 (1.18)	99.0 (28.9)	98.0 (0.773)	97.8 (0.785)	65.1 (0.042)	98.7 (51.4)
Water extract	0.4 (0.005)	0.4 (0.114)	0.6 (0.005)	0.7 (0.005)	5.1 (0.003)	0.5 (0.275)
Total Extracted	99.3 (1.19)	99.3 (29.0)	98.6 (0.778)	98.5 (0.79)	70.2 (0.046)	99.2 (51.6)
Boscalid	99.3 (1.19)	102.3 (29.8)	96.5 (0.761)	98.3 (0.789)	17.3 (0.011)	101.4 (52.8)
Characterised	<0.1 (<0.001)	<0.1 (0.006)	2.1 (0.016)	0.1 (0.001)	52.8 (0.034) ^a	<0.1 (0.024)
Post-extraction solids	0.7 (0.009)	0.7 (0.191)	1.4 (0.011)	1.5 (0.012)	29.8 (0.019)	0.8 (0.4)
Total	100 (1.20)	103.0 (30.0)	100 (0.789)	100 (0.802)	99.9 (0.065)	102.2 (53.2)

^a five peaks, two up to 0.011 mg eq/kg and 16.7% TRR, three up to 9.2% TRR and 0.006 mg eq/kg

Animal metabolism

The Meeting received a new metabolism study on laying hens using the ^{14}C -pyridin-labeled boscalid.

Laying hens

The metabolism of boscalid in laying hens was investigated by Thiaener J. (2017, BOSC19E_001). Ten laying hens received a dose of ^{14}C -pyridin-labelled boscalid equivalent to 12 ppm for 13 consecutive days via capsule administration. Animals were sacrificed approximately 6 hours after the final dosing. During the whole dosing period eggs and excreta were collected and analysed with pooled tissue samples for each group at the end of the study.

Total radioactive residues (TRR) were determined by combustion and direct liquid scintillation counting (LSC). Samples of tissues and eggs were each extracted with an appropriate solvent (acetonitrile or methanol). Aliquots of the residues after methanol extraction of liver and excreta were each extracted dichloromethane. The residues after this solvent extraction were extracted again with water. Aliquots of the residues after acetonitrile extraction of egg yolk and egg white were each extracted with water. Solubilization with enzymes (protease, pepsin and pancreatin) of the residue after solvent extraction was conducted for egg yolk, liver and muscle. Generally, identification of metabolites was based on analysis by HPLC MS/MS, on co chromatography as well as chromatographic comparison of retention times of reference substances. In addition, various HPLC peaks were characterized by their chromatographic properties. All samples were stored up to a maximum interval of 149 days between sampling and analysis.

In total, approximately 92.5% of the administered dose (AR) was recovered, primarily in the excreta (Table 4). In eggs, TRR levels plateaued after approximately 10 days both in egg white and egg yolk. The TRR levels found in eggs (white and yolk) and in tissues are presented in Table 5.

Table 4 Recovered radioactivity after oral administration of ¹⁴C-pyridin-boscalid (12 ppm) for 13 consecutive days to laying hens

Matrix	% AR
Excreta	87.7
Cage wash	4.59
Egg yolk	0.086
Egg white	0.058
Liver	0.111
Fat	0.000
Muscle	0.026
Bile	0.005
Total	92.5

Table 5 Total radioactive residues in eggs and offal after oral administration of ¹⁴C-pyridin-boscalid (12 ppm) for 13 consecutive days to laying hens

Matrix	TRR in mg eq/kg	
	Egg white	Egg yolk
Day 1	0.019	0.005
Day 2	0.020	0.009
Day 3	0.023	0.034
Day 4	0.027	0.062
Day 5	0.029	0.088
Day 6	0.031	0.105
Day 7	0.034	0.128
Day 8	0.034	0.142
Day 9	0.031	0.143
Day 10	0.028	0.137
Day 11	0.031	0.150
Day 12	0.032	0.146
Day 13	0.031	0.140
Liver	0.439	
Muscle	0.051	
Fat	0.095	

Subsequent solvent extraction released between 68.4% to 94.1% of the TRR, mostly in the acetonitrile or methanol extracts. With dichloromethane and water, an additional amount of up to 1.4% TRR and 9.9% TRR were extracted. Egg white and fat showed low unextracted residues of 8.0% TRR and 5.8% TRR, respectively. In egg yolk, liver and muscle unextracted TRR was higher (22.5–31.8% TRR) and these matrices were subsequently treated with enzymes to release additional radioactivity. Final unextracted residues were less than 10% for each matrix.

Table 6 Total radioactive residues in eggs and offal after oral administration of ¹⁴C-pyridin-boscalid (12 ppm) for 13 consecutive days to laying hens

Extraction	% TRR (mg eq/kg)				
	Egg yolk	Egg white	Liver	Muscle	Fat
TRR	100 (0.123)	100 (0.03)	100 (0.439)	100 (0.051)	100 (0.095)
Solvent extraction					
Acetonitrile or methanol	62.5 (0.077)	85.4 (0.026)	65.1 (0.286)	77.5 (0.039)	94.1 (0.09)
Dichloromethane	NP	NP	1.4 (0.006)	NP	NP
Water	9.9 (0.012)	6.0 (0.002)	1.8 (0.008)	NP	NP
Subtotal solvent extraction	72.4 (0.089)	91.4 (0.028)	68.4 (0.30)	77.5 (0.039)	94.1 (0.09)
Post-extraction solids	28.3 (0.035)	8.0 (0.002)	31.8 (0.14)	22.5 (0.011)	5.8 (0.006)
Protease solubilizate	23.7 (0.029)	NP	21.6 (0.095)	35.1 (0.018)	NP

Extraction	% TRR (mg eq/kg)				
	Egg yolk	Egg white	Liver	Muscle	Fat
Pepsin solubilizate	NP	NP	2.0 (0.009)	NP	NP
Pancreatin solubilizate	NP	NP	1.7 (0.007)	NP	NP
Subtotal enzyme treatment	23.7 (0.029)	NP	25.3 (0.111)	35.1 (0.018)	NP
Unextracted	7.5 (0.009)	8.0 (0.002)	9.6 (0.042)	8.1 (0.004)	5.8 (0.006)

NP: not performed

In the following table the identification and characterisation of the radioactivity found is summarized.

Table 7 Composition of radioactivity in eggs and offal after oral administration of ¹⁴C-pyridin-boscalid (12 ppm) for 13 consecutive days to laying hens

Compound	% TRR (mg eq/kg)				
	Egg yolk	Egg white	Liver	Muscle	Fat
TRR	100 (0.123)	100 (0.03)	100 (0.439)	100 (0.051)	100 (0.095)
Solvent extract					
Boscalid	34.0 (0.042)	34.3 (0.01)	1.8 (0.008)	29.4 (0.015)	84.9 (0.081)
M510F01	27.4 (0.034)	28.1 (0.008)	35.2 (0.155)	10.8 (0.005)	5.3 (0.005)
M510F65	8.4 (0.01)	16.4 (0.005)	18.2 (0.08)	-	-
Characterised as minor peaks	2.6 (0.003) ^a	12.6 (0.004) ^a	13.1 (0.058) ^a	37.2 (0.019) ^a	4.0 (0.004) ^a
Post-extraction solids					
M510F65 (characterized via RT)	23.7 (0.029)	NP	2.2 (0.01)	-	NP
Characterised as minor peaks	-	NP	19.4 (0.085) ¹	35.1 (0.018) ^b	NP
Unextracted	7.5 (0.009)	8.0 (0.002)	9.6 (0.042)	8.1 (0.004)	5.8 (0.006)
Grand total	103.6 (0.127)	99.4 (0.03)	103.2 (0.453)	120.7 (0.061)	100 (0.096)

^a each minor analytical peak <10% TRR and <0.01 mg eq/kg

^b two analytical peaks at 17.5% TRR each and 0.009 mg eq/kg

NP: not performed

The metabolic pathway of ¹⁴C-pyridin-labelled boscalid in laying hens was limited. In the first step, hydroxylation at the diphenyl-ring was observed forming M510F01. In a second step, glucuronidation occurs into M510F65.

In laying hens transfer of radioactivity into eggs plateaued after approximately ten days. Highest TRR levels were found in liver, followed by egg, fat and muscle. Extraction showed that a significant part of the radioactivity in liver, egg yolk and muscle was only released after enzyme treatment. Identification revealed parent boscalid and its metabolites M510F01 and M510F65.

Environmental fate in soil

The Meeting received a large environmental fate data package in addition to the studies already evaluated by previous JMPRs. The Meeting decided to postpone the assessment of all new data received on fate and behaviour in soil, hydrolytic degradation in aquatic systems and photochemical degradation until the next periodic review of boscalid for a complete view of the data and its impact on residues in following crops.

The Meeting also received an additional field rotational crop study on boscalid on fruiting vegetables grown as follow crop after soil treatment. Since this type of study is directly linked to the estimation of maximum residue levels, the current Meeting decided to assess this study before the next periodic review.

Fate and behaviour in soil

The Meeting received the following studies on the fate and behaviour in soil, but decided to postpone their evaluation until the next periodic review of boscalid:

Paulick, R.C. (BOSC19E_003, 2002); Pape, L. (BOSC19E_004, 2014); Class, T. (BOSC19E_005, 2013); Heinz, N. (BOSC19E_006, 2014); Pape, L. (BOSC19E_007, 2014); Sachers, S. (BOSC19E_008, 2015); Schulz, H. (BOSC19E_009, 2002); Budde, E. (BOSC19E_010, 2014); Richter, T. (BOSC19E_011, 2013); Richter, T. (BOSC19E_012, 2013); Oliver, G. (BOSC19E_013, 2001); Jackson, S. (BOSC19E_014, 2001); Jackson, S. (BOSC19E_015, 2001); Jackson, S. (BOSC19E_016, 2001); Jackson, S. (BOSC19E_017, 2001); Jackson, S. (BOSC19E_018, 2003); Gooding, R. (BOSC19E_019, 2001); Gooding, R. (BOSC19E_020, 2003); Richter, T. (BOSC19E_021, 2017); Schriever, C. (BOSC19E_022, 2017); Corden, M. (BOSC19E_023, 2014); Corden, M. (BOSC19E_024, 2014)

Hydrolytic degradation in aquatic systems

The Meeting received the following studies on hydrolytic degradation in aquatic systems, but decided to postpone their evaluation until the next periodic review of boscalid:

Yeomans, P. (BOSC19E_025, 2015); Budde, E. (BOSC19E_026, 2015); Schriever, C. (BOSC19E_027, 2016); Schaefer, D. (BOSC19E_028, 2007)

Photochemical degradation

The Meeting received the following studies on photochemical degradation, but decided to postpone their evaluation until the next periodic review of boscalid:

Goetz, N. von (BOSC19E_029, 2002); Hassink, J. (BOSC19E_030, 2002)

Field rotational crop studies

The Meeting received a new field rotational crop study conducted by Martin, T. (BOSC19E_031, 2015). Four field trials were conducted with three rotational crops (cucumber or zucchini, tomato and seeded lettuce) in different representative growing areas in Northern and Southern Europe. Boscalid was applied once to bare soil approximately 30 days before seeding/planting at a rate of 2.1 kg ai/ha. Specimens of plant were collected at growth stages representative to commercial harvest and stored frozen at or below -18 °C until analysis (Method BASF 535/1, L0076/01, LC-MS/MS) for a maximum period of 100 days for plant material.

In the samples collected, no residues above the LOQ were found in zucchini and tomatoes. Lettuce plants contained boscalid residues above the LOQ for all samples, ranging from 0.014 mg/kg up to 0.12 mg/kg.

Table 8 Residues of boscalid in zucchini, tomatoes and lettuce grown as follow crop after application of 2.1 kg ai/ha to bare soil

Trial site	Application rate, Plantback interval	Commodity	DALA	Boscalid in mg/kg
Germany, Kleve	2.1 kg ai/ha (bare soil), 30 day PBI	Zucchini	73	<0.01
		Tomato	129	<0.01
		Lettuce	73	0.078
		Lettuce	86	0.055
The Netherlands, Limburg	2.1 kg ai/ha (bare soil), 30 day PBI	Zucchini	73	<0.01
		Tomato	129	<0.01
		Lettuce	73	0.018
		Lettuce	86	0.014
Italy, Bologna	2.1 kg ai/ha (bare soil), 30 day PBI	Zucchini	66	<0.01
		Tomato	129	<0.01
		Lettuce	104	0.036
		Lettuce	119	0.038
Spain, Sevilla	2.1 kg ai/ha (bare soil), 30 day PBI	Cucumber	80	<0.01
		Tomato	140	<0.01
		Lettuce	60	0.12
		Lettuce	87	0.022

RESIDUE ANALYSIS**Analytical methods**

For the analysis of boscalid in various plant matrices additional analytical methods were submitted. In the following table an overview of these methods is presented.

Table 9 Overview of analytical methods for boscalid

Method	Matrix	Extraction	Clean-Up	Detection, LOQ
BASF 535/1	High water High oil High starch High acid	methanol, water and hydrochloric acid (70:25:5, v/v/v) Partitioning against cyclohexane	none	HPLC-MS/MS (ESI+) Boscalid m/z: 343→271 (detection) m/z: 343→307 (quantification) LOQ: 0.01 mg/kg
L0076/01	Hops Spices Herbal infusions	methanol, water and hydrochloric acid (70:25:5, v/v/v) Partitioning against cyclohexane	None	HPLC-MS/MS (ESI+) Boscalid m/z: 343→272 (detection) m/z 343→271 (detection and quantification) m/z 343→307 (detection) m/z: 343→140 (quantification) LOQ: 0.01 mg/kg
D9908	High water High oil	Acetonitrile Portioning with hexane	SPE	HPLC-MS/MS (ESI+) Boscalid m/z: 343→307 (detection) LOQ: 0.05 mg/kg
QuEChERS	High water High oil High starch High acid	Acetonitrile + buffer salts	SPE with primary secondary amine	HPLC-MS/MS (ESI+) Boscalid m/z: 343→307 (detection) m/z: 343→271 (quantification) LOQ: 0.01 mg/kg

The Meeting also received additional recovery data for the method 471/0 already evaluated by the 2006 JMPR, measuring residues of boscalid and M510F01 in animal commodities.

Additionally, multiple studies for the analysis of soil and water were submitted. The Meeting decided that the suitability of these methods will be assessed together with the corresponding environmental fate studies during the next periodic review of boscalid.

Plant materials**Method BASF 535/1 (Mackenroth, C., BOSCI9E_032, 2007)**

In method BASF 535/1 residues of boscalid are extracted using a mixture of methanol, water and hydrochloric acid (70:25:5, v/v/v). An aliquot of the extract is centrifuged and partitioned at alkaline conditions against cyclohexane. After evaporation of cyclohexane, the residues are dissolved in methanol/water (50/50, v/v). Detection was accomplished by electrospray ionization in positive mode at mass transition 343→271 for quantification and 343→307 for confirmation.

Table 10 Recovery data for method BASF 535/1 measuring boscalid in plant matrices

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
			343→271	343→307	343→271	343→307
Wheat, plant	0.01	5	93	92	5.2	16.6
	0.1	5	83	84	5.6	7.7
Wheat, grain	0.01	5	84	100	7.3	5.2

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
			343→271	343→307	343→271	343→307
	0.1	5	84	82	4.3	13.9
Wheat, straw	0.01	5	86	86	7.3	11.1
	0.1	5	87	82	11.6	9.4
Lemon, fruit	0.01	5	88	89	2.1	17.4
	0.1	5	82	77	8.7	14.8
Lettuce, head	0.01	5	82	92	6.0	5.3
	0.1	5	82	81	8.8	3.0
Rapeseeds	0.01	5	80	80	7.1	12.9
	0.1	5	84	86	6.5	18.2
Tomato, fruit	0.01	5	86	81	5.0	18.4
	0.1	5	86	82	3.2	9.2
Onion, bulb	0.01	5	88	83	7.0	10.3
	0.1	5	88	81	8.8	9.2

Method L0076/01 (Austin, R., BOSCI9E_033, 2015)

Residues of boscalid are extracted from hops, spices and herbal infusions (green tea) with a mixture of methanol, water and hydrochloric acid (70:25:5, v/v/v). An aliquot of the extract was centrifuged and partitioned in alkaline conditions against cyclohexane, evaporated to dryness and dissolved in methanol/water (1:1, v/v) for analyses. The final determination is performed by LC-MS/MS monitoring selective ion mass transitions 343→272, 343→271, 343→307 and 343→140 using positive electrospray ionization. Table 11 below shows the transitions that were used for each matrix.

Table 11 Recovery data for method L0076/01 measuring boscalid in hops, spices and green tea

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
			1 st Transitions	2 nd Transitions	1 st Transitions	2 nd Transitions
Hops, dry	m/z		343→272	343→140	343→272	343→140
Cones	0.01	5	83	80	6	4
	0.1	5	90	87	2	3
Spices (pepper)	m/z		343→271	343→140	343→271	343→140
	0.01	5	81	83	5	4
	0.1	5	77	77	2	2
Green tea, dry leaves	m/z		343→307	343→271	343→307	343→271
	0.01	5	83	85	2	3
	0.1	5	90	90	9	9

Method D9908 (Jones, J., BOSCI9E_034, 2001)

In method D9908 residues of boscalid were extracted from almond with acetonitrile, cleaned by a liquid/liquid partition with hexane, and further purified. Residues in plum are extracted using a mixture of methanol, water and hydrochloric acid and further cleaned via C₁₈- and Silica Gel-SPE. Residues in onions are extracted using a mixture of methanol, water and hydrochloric acid and an aliquot was

cleaned by liquid/liquid partitioning using cyclohexane, followed by purification via C₁₈- and Silica Gel-SPE. Detection was accomplished by LC-MS/MS using electrospray ionization in positive mode at mass transition 343→307 for quantification.

Table 12 Recovery data for method D9908 measuring boscalid in plant matrices

Matrix	Fortification level (mg/kg)	n	Recoveries % (mean %)	RSD (%)
			343→307	
Almond, nutmeat	0.05	2	73, 84 (79)	-
	3.0	2	82, 85 (84)	-
Plum, fruit	0.05	2	97, 97 (97)	-
	3.0	2	94, 93 (94)	-
Onion, bulb	0.05	4	67, 67, 96, 113 (86)	23
	3.0	2	81, 88 (85)	-

Method QuEChERS (Schernikau, N., BOSCI9E_035, 2015)

Samples of homogenized plant were extracted with acetonitrile after addition of water to the plant matrix. After addition of a buffer salt mixture, containing magnesium sulphate, sodium chloride and sodium citrate, the extract was shaken. After centrifugation, an aliquot of the acetonitrile phase was cleaned by dispersive solid phase extraction, using primary secondary amine (PSA). The samples were analysed using LC-MS/MS to quantify and to confirm boscalid using two mass transitions (343→307 m/z and 343→271 m/z) (ESI+).

Table 13 Recovery data for QuEChERS method measuring boscalid in plant matrices

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
			343→307	343→271	343→307	343→271
Wheat, plant	0.01	5	109	109	3.7	3.8
	0.1	5	102	103	5.8	4.3
Wheat, grain	0.01	5	103	105	2.6	3.5
	0.1	5	101	101	1.5	2.2
Wheat, straw	0.01	5	94.4	97.3	2.8	1.6
	0.1	5	93.4	93.4	4.3	3.9
Lemon, fruit	0.01	5	107	106	3.6	3.2
	0.1	5	106	104	2.4	3.4
Onion, bulb	0.01	5	86.6	87.9	3.2	3.5
	0.1	5	83.8	83.7	6.1	5.6

Animal materials

Method 471/0 – additional recovery data

The general methodology was already evaluated by the 2006 JMPR: “A 25 g sample is extracted with methanol. An aliquot corresponding to a 5 g sample is taken for further work-up. The methanol extract is evaporated to dryness, redissolved in buffer solution and incubated with β-glucuronidase / arylsulfatase to cleave the glucuronide M510F02 to M510F01. Then a liquid / liquid partition with ethyl acetate is carried out and the organic phase is purified on SPE C18 and if necessary on SPE silica gel

columns. The final determination of the analytes boscalid and M510F01 is performed by HPLC/MS/MS.”

In the following table, newly submitted additional recovery data and independent laboratory validation recovery data are summarized.

Table 14 Additional Recovery data for method 471/0 measuring boscalid and M510F01 in animal matrices (Courtois J., 2015, BOSC19E_036)

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
			343→307	343→140	343→307	343→140
Boscalid, m/z:			343→307	343→140	343→307	343→140
Cow, milk	0.01	5	86.0	86.2	3.6	6.7
	0.1	5	88.7	87.6	7.7	11.9
Cow, cream	0.01	5	72.2	73.4	1.5	9.6
	0.1	5	89.9	83.5	4.7	8.7
Cow, muscle	0.025	5	86.4	107	4.0	3.4
	0.25	5	94.5	93.1	1.5	1.8
Cow, fat	0.025	5	80.0	79.9	5.4	5.8
	0.25	5	81.0	80.9	8.5	6.6
Cow, liver	0.025	5	86.7	74.2	6.3	8.7
	0.25	5	96.0	90.9	8.7	8.8
Hen, egg	0.01	5	82.5	88.2	3.8	4.9
	0.1	5	93.1	93.3	3.1	5.3
Cow, kidney			343→307	343→271	343→307	343→271
	0.025	5	83.3	84.5	1.9	27.7
	0.25	5	90.6	92.3	3.9	7.6
M510F01, m/z:			359→323	359→140	359→323	359→140
Cow, milk	0.01	5	88.4	83.3	5.8	5.6
	0.1	5	84.9	82.8	8.6	11.5
Cow, cream	0.01	5	89.5	83.9	1.7	3.2
	0.1	5	94.2	93.9	2.3	6.0
Cow, muscle	0.025	5	89.3	106	2.1	2.9
	0.25	5	86.3	88.6	1.4	4.0
Cow, fat	0.025	5	81.0	79.5	4.0	2.6
	0.25	5	82.6	82.3	7.4	5.5
Cow, kidney	0.025	5	81.6	73.2	2.5	7.0
	0.25	5	82.2	78.7	4.6	4.2
Cow, liver	0.025	5	90.9	91.9	10.3	11.6
	0.25	5	91.5	91.0	6.2	5.1
Hen, egg	0.01	5	82.7	82.5	6.1	4.2
	0.1	5	89.1	88.5	8.2	6.8

Table 15 Independent laboratory validation for method 471/0 measuring boscalid and M510F01 in animal matrices (Weber, H., 2015, BOSC19E_037 and Weber, H., 2015, BOSC19E_038)

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
Boscalid, m/z:			343→307	343→271	343→307	343→271
Cow, muscle	0.01	5	83.3	80.7	4.8	5.1
	0.025	5	78.8	80.7	3.5	6.1
	0.25	5	80.0	80.2	4.7	4.7
Cow, kidney	0.01	5	77.7	77.5	4.6	8.3
	0.025	5	78.1	78.9	4.0	4.8
	0.25	5	74.0	72.5	2.9	3.2
Cow, liver	0.01	5	71.6	78.3	3.1	4.9
	0.025	5	70.8	73.4	8.2	11
	0.25	5	71.9	72.8	5.4	4.4
Cow, fat	0.01	5	87.6	87.5	8.2	8.0
	0.025	5	84.4	83.9	6.2	9.8
	0.25	5	80.9	80.4	7.3	9.5
Cow, cream	0.01	5	73.5	71.2	3.3	4.2
	0.10	5	76.2	78.2	5.8	6.3
Cow, milk	0.01	5	75.6	72.5	5.3	5.0
	0.10	5	85.9	86.8	2.6	5.6
Hen, egg	0.01	5	75.7	74.7	2.1	5.5
	0.10	5	89.9	89.1	3.0	2.4
M510F01, m/z:			359→323	359→140	359→323	359→140
Cow, muscle	0.01	5	78.3	76.4	6.3	7.0
	0.025	5	81.7	82.6	4.7	3.8
	0.25	5	82.6	83.0	4.8	4.1
Cow, kidney	0.01	5	83.1	81.9	2.1	6.7
	0.025	5	79.6	82.0	4.3	5.5
	0.25	5	73.8	75.3	2.2	3.0
Cow, liver	0.01	5	75.1	79.6	3.5	5.7
	0.025	5	74.7	75.4	5.6	6.3
	0.25	5	80.9	82.2	6.6	6.1
Cow, fat	0.01	5	84.5	82.1	6.6	6.4
	0.025	5	86.8	84.0	1.8	3.8
	0.25	5	80.6	80.9	3.3	4.2
Cow, cream	0.01	5	79.3	83.4	3.3	5.0
	0.10	5	86.7	87.0	6.6	6.8

Matrix	Fortification level (mg/kg)	n	Recovery, mean (%)		RSD (%)	
Cow, milk	0.01	5	85.4	80.8	3.2	5.3
	0.10	5	86.8	85.8	11	10
Hen, egg	0.01	5	81.7	79.3	6.0	2.2
	0.10	5	94.5	96.7	2.8	1.9

Soil and water

The Meeting received the following studies on analytical methods for soil and water but decided to postpone their evaluation until the next periodic review of boscalid:

Obermann, M. (BOSC19E_039, 2009); Obermann, M. (BOSC19E_040, 2015); Kreidler, D. (BOSC19E_041, 2013); Ertunc, T. (BOSC19E_042, 2015); Saha, M.G. (BOSC19E_043, 2001); Penning, H. (BOSC19E_044, 2009); Ertunc, T. (BOSC19E_045, 2015); Ertunc, T. (BOSC19E_046, 2015) and Goecer, M. (BOSC19E_047, 2016).

USE PATTERN

Boscalid is registered in many countries for the control of fungal diseases in nearly all crops. In the following table GAP information on all crops/crop groups supported with residue data are summarized.

Table 1: List of uses of boscalid

Crop or crop group	Country	Rate	Number of treatments (minimum interval, days)	Pre-harvest interval (PHI), days
Pome fruits				
Apple	Australia	0.01 kg ai/hL	3 (7 day early growth stage, 10 day after petal fall)	14
	Austria	0.2 kg ai/ha (0.067 kg ai/m crown height/ha)	4 (8)	7
	Belarus	0.2 kg ai/ha	2 (NS)	72
	Belgium	0.2 kg ai/ha	4 (7)	7
	Bulgaria	0.2 kg ai/ha	3 (8)	7
	China	NS	3 (7)	7
	Croatia	0.2 kg ai/ha	3 (10)	7 (stored apples) 14 (directly sold apples)
	Finland	0.21 kg ai/ha	3 (10)	10
	Greece	0.08 kg ai/hL (0.3 kg ai/ha)	3 (10)	7
	Hungary	0.2 kg ai/ha	4 (8)	7
	Ireland	0.2 kg ai/ha	4 (10)	7
	Italy	0.2 kg ai/ha	3 (7)	7
	Japan	×2000 dilution rate (0.0068 kg ai/hL)	3 (NS)	1
	Kazakhstan	0.2 kg ai/ha	3 (NS)	7
	Korea, Republic of	0.32 kg ai/ha	5 (7)	30
	Macedonia	0.2 kg ai/ha	4 (10)	7 (stored apples) 14 (directly sold apples)
	Morocco	0.013 kg ai/hL	3 (14)	7
Netherlands	0.2 kg ai/ha	4 (7)	7	
Peru	0.2 kg ai/ha	2 (14)	7	
Poland	0.2 kg ai/ha	2 (8)	7	
Portugal	0.2 kg ai/ha	3 (7)	7	

Crop or crop group	Country	Rate	Number of treatments (minimum interval, days)	Pre-harvest interval (PHI), days
	Romania	0.2 kg ai/ha	4 (8)	7
	Russian Federation	0.2 kg ai/ha	4 (10)	10
	Serbia	0.2 kg ai/ha	3 (NS)	7
	Slovenia	0.2 kg ai/ha	3 (7)	7
	Spain	0.02 kg ai/hL (up to 0.2 kg ai/ha)	3 (30)	7
	Taiwan, Province of China	×1500 dilution rate (0.017 kg ai/hL)	NS (7)	21
	Turkey	0.1 kg ai/hL	NS	7
	Ukraine	0.2 kg ai/ha	3 (NS)	20
Pear	United Kingdom	0.2 kg ai/ha	4 (10)	7
	Australia	0.01 kg ai/hL	3 (7 days early growth stage, 10 days after petal fall)	14
	Belarus	0.2 kg ai/ha	2 (NS)	72
	Belgium	0.2 kg ai/ha	4 (7)	7
	Bulgaria	0.2 kg ai/ha	3 (8)	7
	Finland	0.21 kg ai/ha	3 (10)	10
	Greece	0.02 kg ai/hL (0.2 kg ai/ha)	3 (10)	7
	Hungary	0.2 kg ai/ha	4 (8)	7
	Ireland	0.2 kg ai/ha	4 (10)	7
	Italy	0.2 kg ai/ha	3 (7)	7
	Japan	×2000 dilution rate (0.0068 kg ai/hL)	3 (NS)	1
	Korea, Republic of	0.32 kg ai/ha	4 (10)	20
	Netherlands	0.2 kg ai/ha	4 (7)	7
	Poland	0.2 kg ai/ha	2 (8)	7
	Portugal	0.2 kg ai/ha	3 (7)	7
	Romania	0.2 kg ai/ha	4 (8)	7
	Russian Federation	0.2 kg ai/ha	4 (10)	10
	Serbia	0.2 kg ai/ha	3 (NS)	7
	Slovenia	0.2 kg ai/ha	3 (7)	7
	Spain	0.02 kg ai/hL (up to 0.2 kg ai/ha)	3 (30)	7
	Taiwan, Province of China	×1500 dilution rate (0.017 kg ai/hL)	4 (7)	15
	Turkey	0.01 kg ai/hL	NS	7
	United Kingdom	0.2 kg ai/ha	4 (10)	7
	Quinces	Bulgaria	0.2 kg ai/ha	3 (8)
Hungary		0.2 kg ai/ha	4 (8)	7
Turkey		0.013 kg ai/hL	NS	7
Pome fruit group	Canada	0.3 kg ai/ha	4 (7)	5
	Czech Republic	0.2 kg ai/ha	4 (8)	7
	France	0.02 kg ai/hL	3 (8)	7
	Germany	0.013 kg ai/hL (0.067 kg ai in 500 L water per m crown height/ha)	4 (8)	7
	Slovakia	0.2 kg ai/ha	3 (NS)	15
	Switzerland	0.2 kg ai/ha	3 (NS)	21
	USA	0.33 kg ai/ha	4 (7)	0
Stone fruits				
Apricots	Spain	0.2 kg ai/ha	2 (7)	7
	Turkey	0.01 kg ai/hL	NS	14
	Ukraine	0.33 kg ai/ha	2 (10)	40
Cherries	Belgium	0.13 kg ai/ha	3 (7)	7
	Bulgaria	0.08 kg ai/ha	3 (10)	7
	Czech Republic	0.013 kg ai/hL (0.067 kg ai in 500 L water per m crown height/ha)	3 (10)	7

Crop or crop group	Country	Rate	Number of treatments (minimum interval, days)	Pre-harvest interval (PHI), days
	Japan	×2000 dilution rate (0.0068 kg ai/hL)	3 (NS)	1
	Macedonia	0.27 kg ai/ha	2 (NS)	7
	Netherlands	0.013 kg ai/hL (max. 0.19 kg/ha)	3 (7)	7
	Norway	0.027 kg ai/hL	2 (5)	Covered by growth stage (during flowering)
	Poland	0.27 kg ai/ha	2 (5)	Covered by growth stage (during flowering)
	Slovakia	0.067 kg ai/ha	3 (10)	7
	Spain	0.2 kg ai/ha	2 (7)	7
	Sweden	0.2 kg ai/ha	3 (7)	3
	Turkey	0.04 kg ai/hL	NS	7
	Ukraine	0.33 kg ai/ha	2 (7)	30
Peaches and nectarines	Argentina	0.013 kg ai/hL	1	7
	Belgium	0.13 kg ai/ha	3 (10)	7
	Japan	×2000 dilution rate (0.0068 kg ai/hL)	3 (NS)	1
	Spain	0.2 kg ai/ha	2 (7)	7
	Turkey	0.027 kg ai/hL	NS	7
	Ukraine	0.33 kg ai/ha	2 (10)	40
	Uruguay	0.25 kg ai/ha	2	Covered by growth stage (up to petal fall)
Plums	Austria	0.19 kg ai/ha (0.063 kg ai/m crown height/ha)	3 (7)	7
	Belgium	0.13 kg ai/ha	3 (7)	7
	Netherlands	0.013 kg ai/hL (max. 0.19 kg/ha)	3 (7)	7
	Norway	0.027 kg ai/hL	2 (5)	Covered by growth stage (during flowering)
	Slovakia	0.067 kg ai/ha	3 (10)	7
	Spain	0.2 kg ai/ha	2 (7)	7
	Sweden	0.2 kg ai/ha	3 (7)	3
Stone fruit group	Austria	0.19 kg ai/ha (0.063 kg ai/m crown height/ha)	3 (10-14)	7
	Canada	0.26 kg ai/ha	5 (7)	0
	Chile	0.6 kg ai/ha	1	3
		0.25 kg ai/ha	2 (10)	0
	Germany	0.013 kg ai/hL (0.067 kg ai in 500 L water per m crown height/ha)	3 (10)	7
	Hungary	0.27 kg ai/ha	3 (7)	7
	Italy	0.2 kg ai/ha	3 (7)	3
	Malta	0.2 kg ai/ha	3 (7)	3
	Portugal	0.02 kg ai/hL (0.2 kg ai/ha)	3 (7)	7
	Slovenia	0.2 kg ai/ha	2 (10)	7
USA	0.26 kg ai/ha	5 (7)	0	
Small stone fruits (Japanese apricot, apricot, plum)	Japan	×2000 dilution rate (0.0068 kg ai/hL)	2 (NS)	7
Berries and other small fruits				
Blackberries	Austria	0.25 kg ai/ha (field and glasshouse)	3 (7-10)	7
	Belgium	0.13 kg ai/ha (field and glasshouse)	2 (7)	3 (field) 7 (glasshouse)
	Canada	0.4 kg ai/ha	4 (7)	0

Crop or crop group	Country	Rate	Number of treatments (minimum interval, days)	Pre-harvest interval (PHI), days
	Chile	0.6 kg ai/ha	2 (NS)	0
	Germany	0.25 kg ai/ha (field and glasshouse)	3 (7-10)	7
	Netherlands	0.4 kg ai/ha	2 (7)	3
	Spain	0.4 kg ai/ha	2 (7)	3
Blueberries	Argentina	0.25 kg ai/ha	1	7
	Bulgaria	0.4 kg ai/ha	2 (7)	3
	Canada	0.4 kg ai/ha	4 (7)	0
	Hungary	0.27 kg ai/ha	2 (7)	14
	Malta	0.4 kg ai/ha	2 (7)	3
	Morocco	0.13 kg ai/ha	1	14
	Peru	0.2 kg ai/ha	1	1
	Poland	0.45 kg ai/ha	2 (10)	Covered by growth stage (during flowering)
	Slovenia	0.27 kg ai/ha	2 (7)	7
	Spain	0.4 kg ai/ha	2 (7)	3
	Uruguay	0.05 kg ai/hL	2 (7)	7
Cranberries	Belgium	0.13 kg ai/ha (field and glasshouse)	2 (7)	3
Currants	Hungary	0.27 kg ai/ha	2 (7)	14
	Malta	0.4 kg ai/ha	2 (7)	3
	Netherlands	0.4 kg ai/ha	2 (7)	3
	Poland	0.45 kg ai/ha	2 (7)	
	Spain	0.4 kg ai/ha	2 (7)	3
Raspberries	Austria	0.25 kg ai/ha (field and glasshouse)	3 (7-10)	7
	Canada	0.39 kg ai/ha	4 (7)	0
	Chile	0.6 kg ai/ha	2 (NS)	0
	Germany	0.25 kg ai/ha (field and glasshouse)	3 (7-10)	7
	Netherlands	0.4 kg ai/ha	2 (7)	3
	Poland	0.48 kg ai/ha	2 (7)	Covered by growth stage (during flowering)
	Spain	0.4 kg ai/ha	2 (7)	3
Bush berries subgroup	Germany	0.25 kg ai/ha (field and glasshouse)	3 (7-10)	7
	Italy	0.4 kg ai/ha	2 (7)	3
	USA	0.4 kg ai/ha	4 (7)	0
Cane berries subgroup	Malta	0.4 kg ai/ha	2 (7)	3
	USA	0.4 kg ai/ha	4 (7)	0
Assorted tropical and subtropical fruits				
Avocado	Mexico	0.25 kg ai/ha	1	14
	Peru	0.25 kg ai/ha	2 (7)	NS
Mango	Brazil	0.024 kg ai/hL (0.24 kg ai/ha)	2 (15)	7
	Mexico	0.3 kg ai/ha	2 (7)	0
	Peru	0.2 kg ai/ha and 0.019 kg ai/hL	2 (7)	7
	Taiwan, Province of China	×2000 dilution rate (0.017 kg ai/hL)	2 (7)	6
Papaya	Belize	0.25 kg ai/ha	6 (7)	0
	Costa Rica	0.25 kg ai/ha	6 (7)	0
	Mexico	0.3 kg ai/ha	3 (7)	0
	Taiwan, Province of China	×1500 dilution rate (0.014 kg ai/hL)	4 (10)	12
Pomegranate	Turkey	0.0126 kg ai/hL	3 (bud formation up to final fruit size)	Not specified

Crop or crop group	Country	Rate	Number of treatments (minimum interval, days)	Pre-harvest interval (PHI), days
Tropical fruit group (Avocado, Black sapote, Canistel, Mamey Sapote, Mango, Papaya, Sapodilla, Star apple)	USA	0.33 kg ai/ha	2 (7)	0
Tea				
Tea	Japan	×2000 dilution rate (0.0068 kg ai/hL)	2 (NS)	7

NS: not stated or not defined

RESULTS OF SUPERVISED RESIDUE TRIALS ON CROPS

Residue levels were reported as measured. Application rates were always reported as boscalid equivalents. When residues were not detected they are shown as below the LOQ, e.g., < 0.01 mg/kg. Application rates, spray concentrations and mean residue results have generally been rounded to the even with two significant figures. The residue values from trials conducted according to maximum GAP that have been used for the estimation of maximum residue levels, STMR and HR, are underlined.

Laboratory reports included method validation including batch recoveries with spiking at residue levels similar to those occurring in samples from the supervised trials. Dates of analyses or duration of residue sample storage were also provided. Field reports provided data on the sprayers used and their calibration, plot size, residue sample size and sampling date. Although trials included control plots, no control data are recorded in the tables except where residues in control samples exceeded the LOQ. Residue data are recorded unadjusted for percent recovery.

Boscalid - Supervised residue trials

Commodity	Indoor/Outdoor	Treatment	Countries	Table
Apples (new data)	Outdoor	Foliar	Argentina, Belgium, Canada, France, Italy, Netherlands, USA	Table 17
Apples (2006 data)	Outdoor	Foliar	Belgium, France, Germany, Italy, Netherlands	Table 18
Pear	Outdoor	Foliar	Argentina, Canada, France, Germany, Italy, Netherlands, Poland, Spain, United Kingdom, USA	Table 19
Cherries (new data)	Outdoor	Foliar	Austria, Canada, Denmark, France, Germany, Hungary, Italy, Netherlands, Poland, Sweden, USA	Table 20
Cherries (2006 data)	Outdoor	Foliar	USA	Table 21
Peaches (new data)	Outdoor	Foliar	Canada, France, Germany, Italy, USA	Table 22
Peaches (2006 data)	Outdoor	Foliar	USA	Table 23
Plums (new data)	Outdoor	Foliar	Canada, Denmark, France, Germany, Italy, Sweden, USA	Table 24
Plums (2006 data)	Outdoor	Foliar	USA	Table 25
Blueberries (new data)	Outdoor	Foliar	Canada, USA	Table 26
Blueberries (2006 data)	Outdoor	Foliar	Canada, USA	Table 27
Blueberries	Indoor	Foliar	Germany	Table 24
Currants	Indoor	Foliar	Germany	Table 25
Raspberries (2006 data)	Outdoor	Foliar	Canada, USA	Table 26
Avocado	Outdoor	Foliar	USA	Table 27
Mango	Outdoor	Foliar	Brazil	Table 28
Pomegranate	Outdoor	Foliar	Greece, Italy, Spain	Table 29
Tea	Outdoor	Foliar	China, India, Japan, Taiwan (Province of China)	Table 30

Table 17 Residues of boscalid in apples (submitted to the Extra 2019 JMPR Meeting)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Southern America (cGAP: none)								
Argentina, Lujan de Cuyo 2002 (Gala)	2 × 0.23	NS	4 × 0.013	Up to BBCH 75	Whole fruit	1 10 20 45 89	0.34 0.17 0.08 <0.05 <0.05	2003/1026457- BOSC19E_056 Method: 445/0 modified Storage period: 3 months
	2 × 0.45	NS	4 × 0.025	Up to BBCH 75	Whole fruit	1 10 20 45	0.94 0.43 0.24 0.10	
Argentina, Allen 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 7 15	0.16, 0.18, 0.12, 0.17 (0.16) 0.18, 0.21, 0.2, 0.27 (0.24) 0.12, 0.15, 0.16, 0.16 (0.15)	2016/3004409-G150156, BOSC19E_057 Method: L0076/09 Storage period: 12 months
Argentina, Tunuyán 2014/2015 (Chañar 34) (Red Chief)	0.25	-	NS	NS	Whole fruit	1 7 15	0.2, 0.12, 0.2, 0.19 (0.18) 0.17, 0.16, 0.16, 0.14 (0.16) 0.058, 0.067, 0.046, 0.039 (0.052)	2016/3004409-G150157, BOSC19E_057 Method: L0076/09 Storage period: 12 months 2016/3004409-G150158
	0.25	-	NS	NS	Whole fruit	1 7 15	0.18, 0.2, 0.27, 0.27 (0.23) 0.2, 0.25, 0.18, 0.23 (0.22) 0.12, 0.16, 0.11, 0.081 (0.12)	
Argentina, Ingeniero Huergo 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 8 15	0.12, 0.13, 0.09, 0.14 (0.12) 0.14, 0.11, 0.14, 0.14 (0.13) 0.16, 0.19, 0.13, 0.12 (0.15)	2016/3004409-G150389, BOSC19E_057 Method: L0076/09 Storage period: 12 months
Argentina, Mainqué 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 8 15	0.15, 0.15, 0.12, 0.13 (0.14) 0.16, 0.12, 0.13, 0.16 (0.14) 0.12, 0.13, 0.13, 0.13 (0.13)	2016/3004409-G150390, BOSC19E_057 Method: L0076/09 Storage period: 12 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Argentina, Tupungato 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1	0.29, 0.17, 0.13, 0.22 (0.2)	2016/3004409-G150391, BOSC19E_057 Method: L0076/09 Storage period: 12 months
						8	0.18, 0.16, 0.20, 0.21 (0.19)	
						15	0.11, 0.12, 0.11, 0.11 (0.11)	
Europe (cGAP: CZ, 4 × 0.2 kg ai/ha, 8 day interval, 7 d PHI)								
Belgium, Limburg 2003 (Decofta)	4 × 0.2 (SE)	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0	0.27	2004/1000752-AGR/09/03, BOSC19E_053 Method: 445/0 Storage period: 3 months
						21	0.23	
						28	0.19	
						35	0.26	
						42	0.22	
France, Rottelsheim 2003 (Golden)	4 × 0.2 (SE)	NS	4 × 0.02	Up to BBCH 77	Whole fruit	0	0.33	2004/1000752-FAN/09/03, BOSC19E_053 Method: 445/0 Storage period: 3 months Final application: 04.08.2003
						20	0.21	
						28	0.13	
						35	0.14	
						42	0.11	
France, Bouloc 2003 (Star Krimson)	4 × 0.2 (SE)	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0	0.87	2004/1000752-FTL/05/03, BOSC19E_053 Method: 445/0 Storage period: 3 months Final application: 14.08.2003
						21	0.56	
						28	0.62	
						35	0.40	
						42	0.55	
Italy, Montemarcino 2003 (Copper 4)	4 × 0.2 (SE)	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0	0.61	2004/1000752-ITA/07/03, BOSC19E_053 Method: 445/0 Storage period: 3 months Final application: 14.08.2003
						21	0.54	
						29	0.46	
						35	0.32	
						42	0.34	
Netherlands, Groesbeek 2003 (Golden Delicious)	4 × 0.2 (SE)	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0	0.82	2004/1000752-AGR/10/03, BOSC19E_053 Method: 445/0 Storage period: 3 months
						20	0.77	
						27	0.51	
						34	0.60	
						41	0.41	
Northern America (cGAP: CZ, 4 × 0.33 kg ai/ha, 7 d interval, 0 d PHI)								
USA, Hereford (PN) 2001 (Starkrimson Red Delicious)	6 × 0.34- 0.35	6-8	6 × 0.066- 0.067	50-70mm to harvest	Whole fruit	0	1.1	2002/5002108-2001828, BOSC19E_048 Method: D9908 Storage period:7 months
USA, Dundee (NY) 2001 (Empire)	6 × 0.34	6-8	6 × 0.071- 0.072	BBCH81 to Harvest	Whole fruit	0	1.2	2002/5002108-2001829, BOSC19E_048 Method: D9908 Storage period:7 months
USA, Alton (NY)	6 × 0.34	6-8	6 × 0.045	50-75mm to harvest	Whole fruit	0	0.78	2002/5002108-2001830, BOSC19E_048

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
2001 (Red Delicious)			+ postharvest spray at 2000 mg/L		Whole fruit	0	1.6	Method: D9908 Storage period:7 months
			+ postharvest dip at 2000 mg/L		Whole fruit	0	3.9	
			+ postharvest spray+dip at 2000 mg/L		Whole fruit	0	3.3	
			+ postharvest drench at 2000 mg/L		Whole fruit	0	1.8	
	6 × 0.34- 0.35	6-8	6 × 0.024	50-75mm to harvest	Whole fruit	0	0.72	
			+ postharvest spray at 2000 mg/L		Whole fruit	0	2.0	
			+ postharvest dip at 2000 mg/L		Whole fruit	0	4.2	
			+ postharvest spray+dip at 2000 mg/L		Whole fruit	0	3.2	
			+ postharvest drench at 2000 mg/L		Whole fruit	0	1.8	
Canada, Berwick (Nova Scotia) 2001 (McIntosh)	0.34 0.34 0.35 0.29 0.34 0.35	7	0.082 0.084 0.083 0.072 0.085 0.084	75mm to harvest	Whole fruit	0	0.94	2002/5002108-2001832, BOSC19E_048 Method: D9908 Storage period:7 months
	0.34 0.34 0.35 0.28 0.34 0.35	7	0.033 0.034 0.034 0.029 0.035 0.035	75mm to harvest	Whole fruit	0	0.96	
USA, Covesville (VA) 2001 (Earligold)	6 × 0.34- 0.35	7	6 × 0.065- 0.07	BBCH73 to harvest	Whole fruit	0	0.42	2002/5002108-2001834, BOSC19E_048 Method: D9908 Storage period:7 months
	6 × 0.34- 0.35	7	6 × 0.03- 0.032	BBCH73 to harvest	Whole fruit	0	0.17	
USA, Conklin (MI) 2001 (Empire)	6 × 0.34	7	6 × 0.024	60mm to harvest	Whole fruit	0	0.49	2002/5002108-2001835, BOSC19E_048 Method: D9908 Storage period:7 months
	6 × 0.34	7	6 × 0.017- 0.018	60mm to harvest	Whole fruit	0	0.34	
Canada, St. George (Ontario) 2001 (Spartan)	6 × 0.34- 0.35	7	6 × 0.071- 0.073	50mm to harvest	Whole fruit	0	1.3	2002/5002108-2001836, BOSC19E_048 Method: D9908 Storage period:7 months
	6 × 0.34- 0.35	7	6 × 0.024- 0.025	50mm to harvest	Whole fruit	0	0.6	

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period	
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid		
Canada, St. Paul d'Abbotsford (Quebec) 2001 (Vista Bella)	6 × 0.33- 0.35	6-7	6 × 0.083- 0.085	Enlarged- harvest	Whole fruit	0	0.48	2002/5002108-2001840, BOSC19E_048 Method: D9908 Storage period:7 months	
	6 × 0.32- 0.35	6-7	6 × 0.019- 0.02	Enlarged- harvest	Whole fruit	0	0.46		
Canada, Granby (Quebec) 2001 (Spartan)	6 × 0.32- 0.34	6-8	6 × 0.076- 0.077	Enlarged- harvest	Whole fruit	0	0.73	2002/5002108-2001841, BOSC19E_048 Method: D9908 Storage period:7 months	
	6 × 0.33- 0.35	6-8	6 × 0.015- 0.016	Enlarged- harvest	Whole fruit	0	0.43		
USA, Eckert (CO) 2001 (Red Delicious)	6 × 0.34	7	6 × 0.072	BBCH78- harvest	Whole fruit	0	0.82	2002/5002108-2001842, BOSC19E_048 Method: D9908 Storage period:7 months	
	6 × 0.34	7	6 × 0.024	BBCH78- harvest	Whole fruit	0	0.92		
USA, Yuba City (CA) 2001 (Light Red Fuji)	6 × 0.34- 0.35	7	6 × 0.12	Fruit dev. up to harvest	Whole fruit	0	0.42	2002/5002108-2001938, BOSC19E_048 Method: D9908 Storage period:7 months	
	6 × 0.34	7	6 × 0.028	Fruit dev. up to harvest	Whole fruit	0	1.1		
USA, Porterville (CA) 2001 (Granny Smith)	6 × 0.34	7	6 × 0.062- 0.064	50mm to harvest	Whole fruit	0	1.1	2002/5002108-2001939, BOSC19E_048 Method: D9908 Storage period:7 months	
					+ postharvest spray at 2000 mg/L	Whole fruit	0		3.1
					+ postharvest dip at 2000 mg/L	Whole fruit	0		2.7
					+ postharvest spray+dip at 2000 mg/L	Whole fruit	0		4.6
					+ postharvest drench at 2000 mg/L	Whole fruit	0		2.5
	6 × 0.34	7	6 × 0.011	50mm to harvest	Whole fruit	0	0.84		
					+ postharvest spray at 2000 mg/L	Whole fruit	0		2.3
					+ postharvest dip at 2000 mg/L	Whole fruit	0		3.7
					+ postharvest spray+dip at 2000 mg/L	Whole fruit	0		4.1
					+ postharvest drench at 2000 mg/L	Whole fruit	0		2.5
USA, Ephrata (WA) 2001	6 × 0.34	7	6 × 0.071- 0.072	BBCH86- 89	Whole fruit	0	0.85	2002/5002108-2001942, BOSC19E_048 Method: D9908	

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period	
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid		
(Red Delicious)	+ postharvest spray at 2000 mg/L				Whole fruit	0	3.3	Storage period:7 months Final treatment: 27.09.2001	
	+ postharvest dip at 2000 mg/L				Whole fruit	0	2.1		
	+ postharvest spray+dip at 2000 mg/L				Whole fruit	0	3.1		
	+ postharvest drench at 2000 mg/L				Whole fruit	0	2.6		
	6 × 0.34	7 d	6 × 0.018	BBCH86- 89	Whole fruit	0	0.9		
		+ postharvest spray at 2000 mg/L				Whole fruit	0		2.4
		+ postharvest dip at 2000 mg/L				Whole fruit	0		2.7
		+ postharvest spray+dip at 2000 mg/L				Whole fruit	0		3.7
		+ postharvest drench at 2000 mg/L				Whole fruit	0		2.0
USA, Ephrata (WA) 2001	6 × 0.34	7	6 × 0.071- 0.072	Up to harvest	Whole fruit	0	1.8	2002/5002108-2001943, BOSC19E_048 Method: D9908	
(Gala)	6 × 0.34	7	6 × 0.009	Up to harvest	Whole fruit	0	0.68	Storage period:7 months Final treatment: 19.09.2001	
USA, Hood River (OR) 2001	6 × 0.34- 0.35	7	6 × 0.044- 0.051	50mm to harvest	Whole fruit	0	0.62	2002/5002108-2001944, BOSC19E_048 Method: D9908	
(Jonagold)	6 × 0.34- 0.35	7	6 × 0.016- 0.017	50mm to harvest	Whole fruit	0	0.62	Storage period:7 months	
USA, Caldwell (ID) 2001	6 × 0.34- 0.35	6-8	6 × 0.049- 0.061	75mm to harvest	Whole fruit	0	0.31	2002/5002108-2001945, BOSC19E_048 Method: D9908	
(Empire)	6 × 0.33- 0.35	6-8	6 × 0.012- 0.017	75mm to harvest	Whole fruit	0	0.24	Storage period:7 months	

DALA: days after last application

NS: not stated

Table 18 Summary information on residues of boscalid in apples (reported in the 2006 JMPR Evaluation)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: CZ, 4 × 0.2 kg ai/ha, 8 day interval, 7 PHI)								
Belgium, Kortenaeken 2001 (Jonagold)	4 × 0.2	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0 6 13 22 27	0.39 <u>0.37</u> 0.26 0.26 0.16	2001/1015029-AGR/15/01
France, Cambrai 2000 (Jonagold)	4 × 0.2- 0.22	8	4 × 0.02	BBCH 77-85	Whole fruit	0 6 13 21 28	0.55 <u>0.34</u> 0.31 0.17 0.15	2001/1000946-X006203
France, St. Loup Terrier 2000 (Jonagold)	4 × 0.2- 0.21	7	4 × 0.02	BBCH 81-85	Whole fruit	0 7 15 22 28	0.56 <u>1.2</u> 0.42 0.52 0.43	2001/1000946-X006204
France, Buzet sur Baize 2000 (Canada)	4 × 0.2- 0.21	7-9	4 × 0.02	BBCH 78-81	Whole fruit	0 7 14 21 28	0.38 <u>0.51</u> 0.39 0.28 0.22	2001/1000946-X006205
France, Le Beugnon 2000 (Golden)	4 × 0.2- 0.21	8	4 × 0.02	BBCH 75-77	Whole fruit	0 7 14 21 28	0.51 <u>0.42</u> 0.42 0.18 0.075	2001/1000946-X006206
France, Chevire 2001 (Golden Smothee)	4 × 0.2	NS	4 × 0.02	Up to BBCH 85	Whole fruit	0 8 14 20 28	0.42 0.38 0.35 <u>0.39</u> 0.20	2001/1015029-FBM/02/01
France, Verquies 2001 (Ozar Gold)	4 × 0.2- 0.21	8 d	4 × 0.02	BBCH 77-85	Whole fruit	0 7 14 21 28	0.73 <u>0.65</u> 0.41 0.43 0.47	2001/1015046-X0106208
France, Verquies 2001 (Golden Delicious)	4 × 0.19- 0.21	8	4 × 0.02	BBCH 77-	Whole fruit	0 7 14 21 28	0.60 <u>0.53</u> 0.51 0.35 0.35	2001/1015046-X0106209
France, Rottelsheim 2003 (Golden)	4 × 0.2 (SE)	7-8	4 × 0.02	Up to BBCH 85	Whole fruit	0 8 15 22 29	0.24 <u>0.32</u> 0.23 0.25 0.20	2004/1001291-FAN/18/03
	4 × 0.2 (WG)					0 8 15 22 29	0.42 0.24 0.19 0.20 0.15	

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
France, Bouloc 2003 (Star Krimson)	4 × 0.2 (SE)	7-8	4 × 0.02	Up to BBCH 87	Whole fruit	0 7 14 21 28	0.92 <u>0.86</u> 0.43 0.51 0.70	2004/1001291-FLT/15/03
	4 × 0.2 (WG)	7-8	4 × 0.02	Up to BBCH 87	Whole fruit	0 7 14 21 28	0.85 0.49 0.38 0.30 0.29	
Germany, Vehlefanzen 2000 (Pinova)	4 × 0.2- 0.21	7-8	4 × 0.02	BBCH 76-78	Whole fruit	0 6 14 21 28	0.3 <u>0.15</u> 0.14 0.14 0.11	2001/1006135-ACK/06/00
Germany, Stetten a.H. 2000 (Jonagold)	4 × 0.2	- 7 8 10	4 × 0.02	BBCH 77-81	Whole fruit	0 7 14 21 28	0.35 <u>0.36</u> 0.27 0.24 0.16	2001/1006135-DU2/12/00
Germany, Eschbach 2000 (Braeburn)	4 × 0.2- 0.21	- 7 8 10	4 × 0.02	BBCH 77-81	Whole fruit	0 7 14 21 28	0.38 <u>0.32</u> 0.28 0.19 0.19	2001/1006135-DU4/11/00
Germany, Stetten a.H. 2001 (Golden Delicious)	4 × 0.2	NS	4 × 0.02	Up to BBCH 85	Whole fruit	0 7 14 21 27	0.81 <u>0.55</u> 0.52 0.41 0.47	2001/1015029-DU2/07/01
Germany, Vehlefanzen 2003 (Piros)	4 × 0.2 (SE)	7-8	4 × 0.02	Up to BBCH 77	Whole fruit	0 8 15 21 28	0.37 <u>0.29</u> 0.16 0.16 0.17	2003/1001291-ACK/11/03
	4 × 0.2 (WG)	7-8	4 × 0.02	Up to BBCH 77	Whole fruit	0 8 15 21 28	0.23 0.14 0.13 0.11 0.08	
Italy, Ferrara 2000 (Red Chief)	4 × 0.2	7-9	4 × 0.02	BBCH 78-85	Whole fruit	0 7 13 20 27	0.36 <u>0.30</u> 0.19 0.20 0.22	2001/1000946-0025R
Italy, Forli 2000 (Royal Gala)	4 × 0.19- 0.22	7-8	4 × 0.02	BBCH 78-85	Whole fruit	0 8 14 22 28	0.36 <u>0.29</u> 0.24 0.14 0.12	2001/1000946-0026R
Italy, Ferrara 2001 (Red Chief)	4 × 0.2	8	4 × 0.02	BBCH 75-85	Whole fruit	0 7 14 21 27	0.13 <u>0.24</u> 0.13 0.16 0.15	2001/1015046-0148R

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Italy, Argenta 2001 (Golden Delicious)	4 × 0.2	7-9	4 × 0.02	BBCH 77-81	Whole fruit	0 7 14 21 28	0.27 <u>0.20</u> 0.18 0.20 0.18	2001/1015046-0149R
Italy, Cesena 2001 (Royal Gala)	4 × 0.2- 0.21	8	4 × 0.02	BBCH 72-77	Whole fruit	0 6 13 20 27	0.22 <u>0.19</u> 0.13 0.11 0.09	2001/1015046-0150R
Italy, Montemarcino 2003 (Golden Delicious)	4 × 0.2 (SE)	7-8	4 × 0.02	Up to BBCH 78	Whole fruit	0 7 15 21 28	0.46 0.35 0.39 0.32 0.16	2004/1001291-ITA/09/03
	4 × 0.2 (WG)	7-8	4 × 0.02	Up to BBCH 78	Whole fruit	0 7 15 21 28	0.55 <u>0.43</u> 0.17 0.20 0.17	
Netherlands, Groesbeek 2001 (Elstar)	4 × 0.2	NS	4 × 0.02	Up to BBCH 81	Whole fruit	0 8 13 21 29	0.24 <u>0.42</u> 0.25 0.26 0.15	2001/1015029-AGR/16/01

DALA: days after last application

NS: not stated

Table 19 Residues of boscalid in pears

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Southern America (cGAP: none)								
Argentina, Allen 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 7 15	0.34, 0.28, 0.25, 0.37 (0.31) 0.23, 0.053, 0.34, 0.28 (0.23) 0.29, 0.17, 0.15, 0.23 (0.21)	2016/3004402-G150153, BOSC19E_058 Method: L0076/09 Storage period: 12 months
Argentina, Vista Flores 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 7 15	0.31, 0.31, 0.35, 0.28 (0.31) 0.24, 0.22, 0.17, 0.19 (0.21) 0.24, 0.14, 0.2, 0.21 (0.2)	2016/3004402-G150154, BOSC19E_058 Method: L0076/09 Storage period: 12 months
Argentina, Tunuyán 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 7 15	0.2, 0.16, 0.17, 0.21 (0.18) 0.15, 0.22, 0.17, 0.17 (0.18) 0.15, 0.18, 0.15, 0.13 (0.15)	2016/3004402-G150155, BOSC19E_058 Method: L0076/09 Storage period: 12 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Argentina, Villa Regina 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 8 15	0.074, 0.071, 0.1, 0.13 (0.094) 0.078, 0.08, 0.11, 0.099 (0.092) 0.096, 0.09, 0.11, 0.08 (0.094)	2016/3004402-G150392, BOSC19E_058 Method: L0076/09 Storage period: 12 months
Argentina, Mainqué 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 8 15	0.17, 0.19, 0.22, 0.17 (0.19) 0.18, 0.21, 0.13, 0.14 (0.16) 0.12, 0.12, 0.089, 0.11 (0.11)	2016/3004402-G150393, BOSC19E_058 Method: L0076/09 Storage period: 12 months
Argentina, Tupungato 2014/2015 (NS)	0.25	-	NS	NS	Whole fruit	1 8 15	0.081, 0.09, 0.1, 0.2 (0.12) 0.14, 0.11, 0.14, 0.16 (0.14) 0.12, 0.082, 0.098, 0.12 (0.1)	2016/3004402-G150394, BOSC19E_058 Method: L0076/09 Storage period: 12 months
Europe (cGAP: CZ, 4 × 0.2 kg ai/ha, 8 day interval, 7 PHI)								
France, Orange 2014 (Guyot)	4 × 0.2	6-8	4 × 0.02	BBCH 74-78	Whole fruit	0 8 15 22	0.30 0.084 <u>0.086</u> 0.068	2016/1041500-L140650, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Germany, Heidesheim 2014 (Gräfin von Paris)	4 × 0.2	7	4 × 0.02	BBCH 79-85	Whole fruit	0 8 14 21	0.13 <u>0.11</u> 0.072 0.089	2016/1041500-L140646, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Greece, Arseni 2014 (Krystali)	4 × 0.2	7	4 × 0.02	BBCH 76-81	Whole fruit	0 7 14 22	0.35 <u>0.29</u> 0.22 0.16	2016/1041500-L140651, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Italy, Volpedo 2014 (Santa Maria)	4 × 0.2	7	4 × 0.02	BBCH 75-77	Whole fruit	0 8 14 20	0.31 0.14 <u>0.16</u> 0.094	2016/1041500-L140652, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Netherlands, Gelderland 2014 (Doyenné du Comice)	4 × 0.2	6-8	4 × 0.02	BBCH 77-83	Whole fruit	0 8 15 22	0.71 <u>0.33</u> 0.33 0.26	2016/1041500-L140647, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Poland, Dmosin 2014 (Konjerencja)	4 × 0.2	6-8	4 × 0.02	BBCH 78-85	Whole fruit	0 7 14 22	0.34 <u>0.39</u> 0.35 0.27	2016/1041500-L14050, BOSC19E_048 Method: L0076/01 Storage period: 16 months
Spain, Llambiles 2014 (Conference)	4 × 0.2	6-8	4 × 0.02	BBCH 77-81	Whole fruit	0 7 14 22	0.58 <u>0.48</u> 0.40 0.35	2016/1041500-L14048, BOSC19E_048 Method: L0076/01 Storage period: 16 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period			
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid				
United Kingdom, Winchcombe 2014 (Conference)	4 × 0.2	6-8	4 × 0.02	BBCH 76-79	Whole fruit	0 7 14 21	0.97 <u>1.3</u> 0.76 0.78	2016/1041500-L14049, BOSC19E_048 Method: L0076/01 Storage period: 16 months			
Northern America (cGAP: CZ, 4 × 0.33 kg ai/ha, 7 day interval, 0 d PHI)											
USA, Alton (NY) 2001 (Bartlett)	6 × 0.34	7	6 × 0.045	45mm to harvest	Whole fruit	0	0.57	2002/5002108-2001831, BOSC19E_048 Method: D9908 Storage period:7 months			
							+ postharvest spray at 2000 mg/L		Whole fruit	0	2.7
							+ postharvest dip at 2000 mg/L		Whole fruit	0	4.7
							+ postharvest spray+dip at 2000 mg/L		Whole fruit	0	5.2
							+ postharvest drench at 2000 mg/L		Whole fruit	0	2.7
	6 × 0.34	7	6 × 0.024	45mm to harvest	Whole fruit	0	0.74				
							+ postharvest spray at 2000 mg/L		Whole fruit	0	2.6
							+ postharvest dip at 2000 mg/L		Whole fruit	0	4.8
							+ postharvest spray+dip at 2000 mg/L		Whole fruit	0	6.6
							+ postharvest drench at 2000 mg/L		Whole fruit	0	3.1
Canada, Berwick (Nova Scotia) 2001 (Clapps)	6 × 0.34- 0.35	6-7	6 × 0.069- 0.078	40mm to harvest	Whole fruit	0	1.9	2002/5002108-2001833, BOSC19E_048 Method: D9908 Storage period:7 months			
							6 × 0.34- 0.35		6-7	6 × 0.029- 0.031	45mm to harvest
USA, Conklin (MI) 2001 (Bartlett)	6 × 0.34	7-8	6 × 0.041- 0.045	50mm to harvest	Whole fruit	0	1.2	2002/5002108-2001837, BOSC19E_048 Method: D9908 Storage period:7 months Last application: 28.08.2001			
							6 × 0.34		7-8	6 × 0.017- 0.019	50mm to harvest
USA, Conklin (MI) 2001 (Bartlett)	6 × 0.34	7-8	6 × 0.046- 0.05	50mm to harvest	Whole fruit	0	0.78	2002/5002108-2001838, BOSC19E_048 Method: D9908 Storage period:7 months Last application: 28.08.2001			
							6 × 0.34		7-8	6 × 0.019- 0.021	50mm to harvest
Canada, St. George (ON) 2001	6 × 0.33- 0.35	6-7	6 × 0.071- 0.072	70mm to harvest	Whole fruit	0	2.3	2002/5002108-2001839, BOSC19E_048 Method: D9908			

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
(Bosc)	6 × 0.34- 0.35	6-7	6 × 0.024- 0.025	70mm to harvest	Whole fruit	0	0.85	Storage period:7 months
USA, Yuba City (CA) 2001	6 × 0.34	6	6 × 0.078- 0.08	Fruit dev. to harvest	Whole fruit	0	0.69	2002/5002108-2001940, BOSC19E_048 Method: D9908
(Bosc)	6 × 0.34	6	6 × 0.022- 0.023	Fruit dev. to harvest	Whole fruit	0	1.7	Storage period:7 months
USA, Porterville (CA) 2001	6 × 0.33- 0.34	7	6 × 0.062- 0.064	Fruit dev. to harvest	Whole fruit	0	0.89	2002/5002108-2001941, BOSC19E_048 Method: D9908
(Bosc)	+ postharvest spray at 2000 mg/L			Whole fruit	0	4.7	Storage period:7 months	
	+ postharvest dip at 2000 mg/L			Whole fruit	0	5.1		
	+ postharvest spray+dip at 2000 mg/L			Whole fruit	0	6.5		
	+ postharvest drench at 2000 mg/L			Whole fruit	0	6.6		
	6 × 0.34	7	6 × 0.011	Fruit dev. to harvest	Whole fruit	0		0.85
	+ postharvest spray at 2000 mg/L			Whole fruit	0	3.9		
	+ postharvest dip at 2000 mg/L			Whole fruit	0	5.5		
	+ postharvest spray+dip at 2000 mg/L			Whole fruit	0	7.1		
	+ postharvest drench at 2000 mg/L			Whole fruit	0	4.8		
	+ postharvest spray at 2000 mg/L			Whole fruit	0	2.5		
USA, Soap Lake (WA) 2001 (Bartlett)	6 × 0.34	7	6 × 0.047	Fruit dev. to harvest	Whole fruit	0	0.83	2002/5002108-2001946, BOSC19E_048
	+ postharvest dip at 2000 mg/L			Whole fruit	0	2.4	Method: D9908 Storage period:7 months	
	+ postharvest spray+dip at 2000 mg/L			Whole fruit	0	3.7		
	+ postharvest drench at 2000 mg/L			Whole fruit	0	2.6		
	6 × 0.34	7	6 × 0.018	Fruit dev. to harvest	Whole fruit	0		0.87
	+ postharvest spray at 2000 mg/L			Whole fruit	0	2.8		

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
		+ postharvest dip at 2000 mg/L			Whole fruit	0	2.3	
		+ postharvest spray+dip at 2000 mg/L			Whole fruit	0	3.6	
		+ postharvest drench at 2000 mg/L			Whole fruit	0	2.6	
USA, Hood River (OR) 2001 (Starkrimson)	6 × 0.34- 0.35	6-7	6 × 0.049- 0.05	45mm to harvest	Whole fruit	0	0.54	2002/5002108-2001947, BOSC19E_048 Method: D9908
	6 × 0.34	6-7	6 × 0.015- 0.018	45mm to harvest	Whole fruit	0	0.65	Storage period:7 months
USA, Greenleaf (ID) 2001 (Bartlett)	6 × 0.33- 0.35	6-8	6 × 0.049- 0.053	55mm to harvest	Whole fruit	0	0.37	2002/5002108-2001948, BOSC19E_048 Method: D9908
	6 × 0.33- 0.35	6-8	6 × 0.011- 0.012	55mm to harvest	Whole fruit	0	0.38	Storage period:7 months

DALA: days after last application

NS: not stated

Table 20 Residues of boscalid in cherries

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: Austria, 3 × 0.19 kg ai/ha, 10 day interval, 7 d PHI)								
Austria, Scharten 2016 (Regina)	0.26 0.26	5	0.052	BBCH 85	Whole fruit	0 3 7 14	0.21 0.22 0.19 0.14	2017/1000803-L160240 BOSC19E_070 Method: L0076/01 Storage period: 9 months
Denmark, Nyberg 1999 (Kellerils 16)	5 × 0.2	20 56 14 14	5 × 0.02	BBCH 60-85	Whole fruit	0 3 8 15	1.4 0.70 0.54 0.54	2001/1006132-ALB/08/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Denmark, Arslev 1999 (Knuthenborg)	5 × 0.2	12 28 15 14	5 × 0.02	BBCH 61-85	Whole fruit	0 3 7 13	0.32 0.23 0.18 0.22	2001/1006132-ALC/09/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Denmark, Fuenen 2003 (Adriana)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 3 7	0.57 0.57 0.37	2004/1010551-ALB/19/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
Denmark, Otterup 2004 (Stævnsbaer)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 3 7	0.54 0.21 0.16	2005/1004972-ALB/11/04 BOSC19E_067 Method: 445/0 Storage period: 3 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
France, Marmande 1999 (Gros Gain)	4 × 0.2	28 15 13	4 × 0.018- 0.022	BBCH 67-82	Whole fruit	0 3 6 13	0.48 0.32 0.25 0.31	2001/1000934-X996204 BOSC19E_062 Method: 445/0 Storage period: 12 months
France, La Berthonnaire (Noire de Meched)	5 × 0.2	15 28 14 14	5 × 0.022	BBCH 60-85	Whole fruit	0 3 7 14	0.2 0.16 0.16 0.12	2001/1000934-X996205 BOSC19E_062 Method: 445/0 Storage period: 12 months Sampling size only 0.85 kg for DALA 3 and 7.
France, Coulanges la Vineuse 2000 (Belle de Juillet)	5 × 0.2- 0.21	22 42 14 14	5 × 0.029	BBCH 60-87	Whole fruit	0 3 7 14	0.30 0.19 0.089 0.073	2001/1009061-BSF/620-1 BOSC19E_065 Method: 445/0 Storage period: 8 months
France, Jussy 2000 (Marmotte)	5 × 0.2- 0.21	29 14 13 14	5 × 0.025	BBCH 62-85	Whole fruit	0 3 7 14	0.21 0.21 0.18 0.13	2001/1009061-BSF/620-2 BOSC19E_065 Method: 445/0 Storage period: 8 months
France, Beauvoison 2000 (Les Brunots)	5 × 0.2- 0.21	18 7 17 11	5 × 0.04	BBCH 61-85	Whole fruit	0 3 7 14	0.13 0.069 0.1 0.087	2001/1009061-BSF/620-3 BOSC19E_065 Method: 445/0 Storage period: 8 months
France, Buis les Barronies 2000 (Burlat)	5 × 0.2- 0.21	11 7 17 11	5 × 0.04	BBCH 65-85	Whole fruit	0 3 7 14	0.14 0.12 0.17 0.17	2001/1009061-BSF/620-4 BOSC19E_065 Method: 445/0 Storage period: 8 months
France, Verges de Souzay 2003 (Montmorency)	3 × 0.2	14	3 × 0.02	Up to BBCH 85	Whole fruit	0 3 7	0.5 0.29 0.47	2004/1010551-FBM/17/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
France, La Bouscasse 2003 (Duroni)	3 × 0.2	14	3 × 0.02	Up to BBCH 89	Whole fruit	0 3 7	<0.05 0.09 0.14	2004/1010551-FTL/22/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
France, Malijacs 2003 (Regnier)	3 × 0.2	14	3 × 0.02	Up to BBCH 85	Whole fruit	0 4 8	0.85 1.5 1.3	2004/1010551-FBD/16/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
France, Traenheim 2004 (Regina)	3 × 0.2	14	3 × 0.02	Up to BBCH 85	Whole fruit	0 3 7	0.068 <0.05 <0.05	2005/1004972-FAN/16/04 BOSC19E_067 Method: 445/0 Storage period: 5 months
France, Lapalud 2004 (Régnier)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 4 7	0.19 0.18 0.22	2005/1004972-FBD/17/04 BOSC19E_067 Method: 445/0 Storage period: 6 months
France, La Bouscasse 2004 (Regina)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 4 8	0.095 0.072 0.052	2005/1004972-FTL/17/04 BOSC19E_067 Method: 445/0 Storage period: 5 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Germany, Wesendahl 1999 (Karina)	5 × 0.2	17 28 13 14	5 × 0.02	BBCH 60-87	Whole fruit	0 2 7 13	0.24 0.26 0.14 0.18	2001/1006132-ACK/04/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Vehlefan 1999 (K27 Kellerils)	5 × 0.2	14 28 13 14	5 × 0.02	BBCH 60-87	Whole fruit	0 3 7 13	0.65 0.34 0.43 0.30	2001/1006132-ACK/05/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Rödersheim- Gronau 1999 (Scheiders Späte Knorbel)	5 × 0.2	28 7 8 20	5 × 0.02	BBCH 60-85	Whole fruit	0 2 6 12	0.37 0.42 0.24 0.32	2001/1006132-DU4/03/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Vehlefan 2000 (Schattenmorelle)	5 × 0.2	7 1 13 14	5 × 0.02	BBCH 60-87	Whole fruit	0 3 7 14	0.75 0.56 0.53 0.39	2001/1006133-ACK/05/00 BOSC19E_064 Method: 445/0 Storage period: 7 months
Germany, Vehlefan 2003 (K27 Kelores)	3 × 0.2	14	3 × 0.02	Up to BBCH 89	Whole fruit	0 3 7	1.1 0.63 0.7	2004/1010551-ACK/20/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
Germany, Horrenberg 2004 (Geisenheimer Schwarz)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 3 7	0.16 0.15 0.088	2005/1004972-DU2/10/04 BOSC19E_067 Method: 445/0 Storage period: 5 months
Germany, Algesheim 2015 (Hedelfinger)	0.27 0.27	6	0.054	BBCH 85	Whole fruit	0 3 7 14	0.63 0.47 0.37 0.081	2016/1000745-L150126 BOSC19E_069 Method: L0076/01 Storage period: 3 months Last application: 23.06.2015
Germany, Algesheim 2015 (Schattenmorelle)	0.27 0.27	5	0.054	BBCH 85	Whole fruit	0 3 7 14	1.9 0.76 0.63 0.54	2016/1000745-L150128 BOSC19E_069 Method: L0076/01 Storage period: 4 months Last application: 07.07.2015
Germany, Algesheim 2016 (Schattenmorelle)	0.26 0.26	5	0.052	BBCH 85	Whole fruit	0 3 7 14	1.0 0.88 0.88 0.58	2017/1000803-L160242 BOSC19E_070 Method: L0076/01 Storage period: 9 months
Hungary, Lovasbereny 2016 (Úlfehétóifürtös)	0.26 0.26	5	0.052	BBCH 87	Whole fruit	0 3 7 13	1.0 0.99 0.54 0.49	2017/1000803-L160243 BOSC19E_070 Method: L0076/01 Storage period: 9 months
Italy, Modena- Vignola 1999 (Silvia)	5 × 0.2	12 28 13 14	5 × 0.022	BBCH 62-90	Whole fruit	0 3 7 13	0.54 0.25 0.37 0.23	2001/1000934-9936R BOSC19E_062 Method: 445/0 Storage period: 12 months
Italy, Modena- Savignano 1999 (Marasca di Vignola)	5 × 0.2	7 28 14 13	5 × 0.022	BBCH 60-88	Whole fruit	0 3 7 14	0.9 0.44 0.29 0.11	2001/1000934-9937R BOSC19E_062 Method: 445/0 Storage period: 12 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Italy, Nonantola 2000 (Montmercy)	5 × 0.2	7 d 28 14 13	5 × 0.027	BBCH 65-85	Whole fruit	0 3 7 14	0.48 0.59 0.32 0.36	2001/1009061-BSF/620-4 BOSC19E_065 Method: 445/0 Storage period: 8 months
Italy, Solignano 2000 (Pissei)	5 × 0.2	7 28 14 13	5 × 0.025	BBCH 65-89	Whole fruit	0 3 7 14	0.69 0.79 0.69 0.82	2001/1009061-BSF/620-5 BOSC19E_065 Method: 445/0 Storage period: 8 months
Italy, Pecetto Torinese 2003 (Amarisa)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 2 8	0.75 0.43 0.36	2004/1010551-ITA/16/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
Italy, Garbagne 2003 (Sweet Heart)	3 × 0.2	14	3 × 0.02	Up to BBCH 81	Whole fruit	0 2 7	2.5 0.66 0.66	2004/1010551-ITA/17/03 BOSC19E_066 Method: 445/0 Storage period: 5 months
Italy, Pavis 2004 (Nero secondo)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 3 8	0.19 0.13 0.096	2005/1004972-ITA/16/04 BOSC19E_067 Method: 445/0 Storage period: 6 months
Netherlands, Ressen 2015 (Lapins)	0.27 0.27	5	0.054	BBCH 85	Whole fruit	0 3 7 14	0.34 0.17 0.073 0.08	2016/1000745-L150127 BOSC19E_069 Method: L0076/01 Storage period: 3 months
Netherlands, Ressen 2016 (Regina)	0.26 0.26	5	0.052	BBCH 87	Whole fruit	0 3 7 14	0.83 0.43 0.27 0.27	2017/1000803-L160241 BOSC19E_070 Method: L0076/01 Storage period: 9 months
Poland, Wronki 2015 (Lutowka)	0.27 0.27	5	0.054	BBCH 81	Whole fruit	0 3 8 15	0.35 0.27 0.21 0.10	2016/1000745-L150129 BOSC19E_069 Method: L0076/01 Storage period: 3 months
Sweden, Sjöbo 2000 (Regina)	5 × 0.2- 0.22	14 28 15 15	5 × 0.02- 0.022	BBCH 60-87	Whole fruit	0 4 7 14	0.36 0.23 0.2 0.18	2001/1006133-HUS/03/00 BOSC19E_064 Method: 445/0 Storage period: 7 months
Sweden, Sjöbo 2003 (Karina)	3 × 0.2	14	3 × 0.02	Up to BBCH 87	Whole fruit	0 3 7	0.84 0.32 0.39	2004/1010551-HUS/12/03 BOSC19E_066 Method: 445/0 Storage period: 6 months
Sweden, Orelund 2004 (Stevnsbar)	3 × 0.2	14	3 × 0.02	Up to BBCH 85	Whole fruit	0 3 7	0.18 0.21 0.14	2005/1004972-HUS/06/04 BOSC19E_067 Method: 445/0 Storage period: 3 months
Sweden, Malmoe 2004 (Van)	3 × 0.2	14	3 × 0.02	Up to BBCH 81	Whole fruit	0 4 8	<0.05 <0.05 <0.05	2005/1004972-HUS/07/04 BOSC19E_067 Method: 445/0 Storage period: 4 months
Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
USA, Conklin (MI) 2007 (Napoleon)	5 × 0.26	6-8	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	1.6, 1.5 (<u>1.6</u>) 1.1, 0.98 (1.0)	2007/7013460-R070178, BOSC19E_061 Method: D9908 Storage period: 7 months Last application: 28.06.2007
USA, Conklin (MI) 2007 (Montmorency)	5 × 0.26	6-8	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	1.3, 1.5 (<u>1.4</u>) 0.96, 1.4 (1.2)	2007/7013460-R070183, BOSC19E_061 Method: D9908 Storage period: 7 months Last application: 04.07.2007
USA, Plainview (CA) 2007 (Tulare)	5 × 0.26	6-9	5 × 0.018- 0.14	Up to BBCH 85	Whole fruit	0 1	2.5, 2.8 (<u>2.6</u>) 2.2, 2.7 (2.4)	2007/7013460-R070179, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Marysville (CA) 2007 (Lapin)	5 × 0.26	6-7	5 × 0.018- 0.14	Up to BBCH 85	Whole fruit	0 1 5 10	0.06, <0.05 (<u>0.055</u>) <0.05, <0.05 (<0.05) <0.05, <0.05 (<0.05) <0.05, <0.05 (<0.05)	2007/7013460-R070180, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Ephrata (WA) 2007 (Bing)	5 × 0.26	6-7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	1.4, 1.0 (<u>1.2</u>) 0.92, 0.93 (0.92)	2007/7013460-R070181, BOSC19E_061 Method: D9908 Storage period: 7 months
Canada, Pelham (ON) 2007 (Montmorency)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 89	Whole fruit	0 1	2.3, 3.0 (<u>2.6</u>) 1.9, 2.6 (2.3)	2007/7013460-R070182, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Karman (CA) 2007 (Brooks)	5 × 0.26	6-7 d	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	1.8, 1.2 (<u>1.5</u>) 1.1, 1.1 (1.1)	2007/7013460-R070184, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Fennville (MI) 2002 (Montmorency)	0.046 g/kg	-	-	-	post- harvest spray	0	3.4, 3.5 (3.4)	2005/7004639-02-MI38 BOSC19E_068 Method: D9908 Storage period: 4 months
USA, Stockton (CA) 2002 (Bing)	0.046 g/kg	-	-	-	post- harvest spray	0	4.1, 4.9 (4.5)	2005/7004639-02-CA119 BOSC19E_068 Method: D9908 Storage period: 4 months
	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	3.6, 5.0 (4.3)	
USA, Prosser (WA) 2002 (Bing)	0.046 g/kg	-	-	-	post- harvest spray	0	6.6, 7.4 (7.0)	2005/7004639-02-WA47 BOSC19E_068 Method: D9908 Storage period: 4 months

DALA: days after last application

Table 21 Summary information on residues of boscalid in cherries (reported in the 2006 JMPR Evaluation)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, North Rose (NY)	5 × 0.26	6-8	5 × 0.035	15mm to harvest	Whole fruit	0	<u>1.6</u>	2001/5000831-99101
1999 (Montmorency)	5 × 0.26	6-8	5 × 0.019	15mm to harvest	Whole fruit	0	1.4	
USA, Conklin (MI)	5 × 0.26	7	5 × 0.043	13mm to harvest	Whole fruit	0	1.3	2001/5000831-99102
1999 (Montmorency)	5 × 0.26	7	5 × 0.014	13mm to harvest	Whole fruit	0	<u>1.5</u>	
USA, Conklin (MI) 1999 (Sommerset)	5 × 0.26	7	5 × 0.037	30% red colour to harvest	Whole fruit	0	<u>0.76</u>	2001/5000831-99104
	5 × 0.26	7	5 × 0.013	30% red colour to harvest	Whole fruit	0	0.74	
USA, Casnovia (MI)	5 × 0.26	7	5 × 0.043	13mm to harvest	Whole fruit	0	1.1	2001/5000831-99103
1999 (Montmorency)	5 × 0.26	7	5 × 0.014	13mm to harvest	Whole fruit	0	<u>1.2</u>	
USA, Poplar (CA) 1999 (Brooks)	5 × 0.26	7	5 × 0.045	Fruit matur. to harvest	Whole fruit	0	0.64	2001/5000831-99105
	5 × 0.26	7	5 × 0.011	Fruit matur. to harvest	Whole fruit	0	<u>1.0</u>	
USA, Ephrata (WA)	5 × 0.26	7	5 × 0.055	10mm to harvest	Whole fruit	0	0.91	2001/5000831-99106
1999 (Bing)	5 × 0.26	7	5 × 0.013	10mm to harvest	Whole fruit	0	<u>1.5</u>	
USA, Ephrata (WA) 2004 (Bing)	6 × 0.26	7-8	5 × 0.033	50% final size to mature fruit	Whole fruit	0	1.7, 1.3 (<u>1.5</u>)	2005/5000024-RCN2004142

DALA: days after last application

Table 22 Residues of boscalid in peaches

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: Austria, 3 × 0.19 kg ai/ha, 10 d interval, 7 day PHI)								
France, Le Beugnon 1999 (Hale-Haven)	4 × 0.2	84 14 16	4 × 0.022	BBCH 69-81	Whole fruit	0 4 7 14	0.13 0.05 0.05 <0.05	2001/1000934-X996206 BOSC19E_062 Method: 445/0 Storage period: 12 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter-val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
France, Equarrans 1999 (Katia)	4 × 0.2	56 14 14	4 × 0.022	BBCH 69-85	Whole fruit	0 3 7 14	0.32 0.32 0.17 0.13	2001/1000934-X996207 BOSC19E_062 Method: 445/0 Storage period: 12 months
Germany, Horrenberg 1999 (South Haven)	5 × 0.2	27 56 14 14	5 × 0.02	BBCH 60-78	Whole fruit	0 2 7 14	0.33 0.28 0.29 0.20	2001/1006132-DU2/08/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Durlach 1999 (Red Top)	5 × 0.2	20 56 14 14	5 × 0.02	BBCH 60-85	Whole fruit	0 4 7	0.46 0.23 0.15	2001/1006132-DU2/09/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Rödersheim- Gronau 1999 (Red Haven)	5 × 0.2	26 70 13 14	5 × 0.02	BBCH 60-85	Whole fruit	0 3 7 14	0.51 0.84 0.35 0.17	2001/1006132-DU4/02/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Italy, Ravenna 1999 (Fayette)	4 × 0.2	3 mo 14 d 13 d	4 × 0.022	BBCH 69-87	Whole fruit	0 3 6 13	0.29 0.49 0.21 0.12	2001/1000934-9931R BOSC19E_062 Method: 445/0 Storage period: 12 months
Italy, Ferrara 1999 (Duchessa dèste)	5 × 0.2	13 84 14 13	5 × 0.022	BBCH 60-86	Whole fruit	0 3 6 13	0.4 0.38 0.11 0.21	2001/1000934-9932R BOSC19E_062 Method: 445/0 Storage period: 12 months
Italy, Modena 1999 (Red Haven)	5 × 0.2	12 56 13 16	5 × 0.022	BBCH 61-79	Whole fruit	0 2 6 13	0.47 0.38 0.35 0.23	2001/1000934-9933R BOSC19E_062 Method: 445/0 Storage period: 12 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Alton (NY) 2007 (Gold Nine)	5 × 0.26	6-8	5 × 0.018- 0.14	Up to BBCH 89	Whole fruit	0 1	2.8, 3.8 (3.3) 3.9, 3.4 (<u>3.6</u>)	2007/7013460-R070186, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Chula (GO) 2007 (June Gold)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1 5 10	0.9, 0.92 (0.91) 1.1, 1.0 (<u>1.0</u>) 0.66, 0.69 (0.68) 0.57, 0.4 (0.48)	2007/7013460-R070187, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Montezuma (GO) 2007 (MarQueen)	5 × 0.26	6-8	5 × 0.018- 0.14	Up to BBCH 89	Whole fruit	0 1	0.58, 0.7 (<u>0.64</u>) 0.46, 0.55 (0.5)	2007/7013460-R070188, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Conklin (MI) 2007	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 85	Whole fruit	0 1	0.59, 0.73 (0.66) 0.68, 0.74 (<u>0.71</u>)	2007/7013460-R070190, BOSC19E_061 Method: D9908

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
(Bellaire)								Storage period: 7 months
USA, Ada (OK) 2007 (Contender)	5 × 0.26	6-7	5 × 0.018- 0.14	Up to BBCH 89	Whole fruit	0 1	0.64, 0.56 (<u>0.6</u>) 0.56, 0.5 (0.53)	2007/7013460-R070189, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Madera (CA) 2007 (Rayson)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	0.78, 0.8 (<u>0.79</u>) 0.75, 0.79 (0.77)	2007/7013460-R070191, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Jackson Springs (NC) 2002 (Contender)	0.002 8 g/kg	-	-	-	post- harvest spray	0	1.9, 2.1 (2.0)	2005/7004639-02-NC24 BOSC19E_068 Method: D9908 Storage period: 4 months
	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	3.7, 3.5 (3.6)	
USA, Parlier (CA) 2002 (Elegant Lady)	0.002 8 g/kg	-	-	-	post- harvest spray (high vol.)	0	3.1, 2.5 (2.8)	2005/7004639-02-CA116 BOSC19E_068 Method: D9908 Storage period: 4 months
	0.002 8 g/kg	-	-	-	post- harvest spray (low vol.)	0	5.8, 6.5 (6.2)	
	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	6.7, 7.7 (7.2)	
USA, Bridgeton (NJ) 2002 (Dine Red)	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	5.5, 4.8, 4.8, 9.7, 7.1, 6.6 (6.4)	2005/7004639-02-NJ36 BOSC19E_068 Method: D9908 Storage period: 4 months

DALA: days after last application

Table 23 Summary information on residues of boscalid in peaches (reported in the 2006 JMPR Evaluation)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No.
	kg ai/ha	Inter- val	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Hereford (PA) 1999 (Red Haven)	5 × 0.26	7	5 × 0.051	45mm to harvest	Whole fruit	0	0.66	2001/5000831-99107
	5 × 0.26	7	5 × 0.013	45mm to harvest	Whole fruit	0	<u>0.75</u>	
USA, Monetta (SC) 1999 (Contender)	5 × 0.26	7-8	5 × 0.053	35mm to harvest	Whole fruit	0	0.16	2001/5000831-99108
	5 × 0.26	7-8	5 × 0.013	35mm to harvest	Whole fruit	0	<u>0.19</u>	

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No.
	kg ai/ha	Inter-val	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
USA, Winterville (GA)	5 × 0.26	6-7	5 × 0.043	35mm to harvest	Whole fruit	0	0.4	2001/5000831-99109
1999 (Harmony)	5 × 0.26	6-7	5 × 0.021	35mm to harvest	Whole fruit	0	<u>0.42</u>	
USA, Tifton (GA) 1999 (June Gold)	5 × 0.26	7	5 × 0.051	25mm to harvest	Whole fruit	0 7 14 21 28	<u>0.49</u> 0.32 0.21 0.13 0.15	2001/5000831-99110
	5 × 0.26	7	5 × 0.01	25mm to harvest	Whole fruit	0 7 14 21 28	0.48 0.21 0.21 0.14 0.25	
USA, Conklin (MI)	5 × 0.26	7	5 × 0.041	45mm to harvest	Whole fruit	0	<u>0.4</u>	2001/5000831-99111
1999 (Red Haven)	5 × 0.26	7	5 × 0.014	45mm to harvest	Whole fruit	0	0.33	
USA, Vernon (TX)	5 × 0.26	7	5 × 0.051	50mm to harvest	Whole fruit	0	0.64	2001/5000831-99112
1999 (Lauring)	5 × 0.26	7	5 × 0.024	50mm to harvest	Whole fruit	0	<u>0.73</u>	
USA, Porterville (CA) 1999 (Red Sun)	5 × 0.26	- 7 2 11 7	5 × 0.037	50mm to harvest	Whole fruit	0	<u>0.52</u>	2001/5000831-99113
	5 × 0.26	- 7 2 11 7	5 × 0.01	50mm to harvest	Whole fruit	0	0.49	
USA, Selma (CA)	5 × 0.26	6-8	5 × 0.028	Full size to harvest	Whole fruit	0	<u>0.48</u>	2001/5000831-99114
1999 (September Sun)	5 × 0.26	6-8	5 × 0.014	Full size to harvest	Whole fruit	0	0.19	
USA, Gridley (CA)	5 × 0.26	7	5 × 0.05	Fruit matur. to harvest	Whole fruit	0	<u>0.32</u>	2001/5000831-99115
1999 (Loadel)	5 × 0.26	7	5 × 0.021	Fruit matur. to harvest	Whole fruit	0	0.32	
USA, Ephrata (WA) 2004 (Snow King)	5 × 0.26	7	5 × 0.036	60% final size to advanced coloring	Whole fruit	0	1.2, 1.2 (<u>1.2</u>)	2005/5000024-RCN2004134
USA, Carlyle (IL) 2004	5 × 0.26	6-7	5 × 0.033	60% final size to ripe	Whole fruit	0	0.51, 0.47 (<u>0.49</u>)	2005/5000024-RCN2004135

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No.
	kg ai/ha	Inter-val	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
(Cresthaven)				for picking				
Canada, Branchton (ON) 2004 (Red Haven)	5 × 0.26	7	5 × 0.031	60% final size to ripe for picking	Whole fruit	0	0.51, 0.72 (0.60)	2005/5000024-RCN2004136
USA, Nodine (MN) 2004 (Bailey Hardy)	5 × 0.26	7	5 × 0.027	70% final size to ripe for picking	Whole fruit	0	0.82, 0.75 (0.78)	2005/5000024-RCN2004137

DALA: days after last application

Table 24 Residues of boscalid in plums

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter-val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: Austria, 3 × 0.19 kg ai/ha, 10 d interval, 7 day PHI)								
Denmark, Arsløv 1999 (Oullins)	5 × 0.2	20 56 14 14	5 × 0.02	BBCH 60-85	Whole fruit	0 3 7 14	0.15 0.11 0.074 0.15	2001/1006132-ALB/17/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
France, Le Puy 1999 (707 GF 81)	4 × 0.2	56 11 14	4 × 0.02	BBCH 69-81	Whole fruit	0 3 6 14	0.26 0.15 0.15 0.23	2001/1000934-X996203 BOSC19E_062 Method: 445/0 Storage period: 12 months
Germany, Perleberg 1999 (Späte Anna)	5 × 0.2	6 84 14 14	5 × 0.02	BBCH 61-85	Whole fruit	0 3 7 14	0.064 0.061 0.047 0.07	2001/1006132-ACK/07/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Horrenberg 1999 (Stanley)	5 × 0.2	20 84 13 15	5 × 0.02	BBCH 60-85	Whole fruit	0 3 7 14	0.34 0.31 0.45 0.23	2001/1006132-DU2/12/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Rödersheim-Gronau 1999 (St. Hubertus)	5 × 0.2	20 42 14 14	5 × 0.02	BBCH 60-85	Whole fruit	0 4 8	0.26 0.19 0.13	2001/1006132-DU4/09/99 BOSC19E_063 Method: 445/0 Storage period: 11 months
Germany, Limburgerhof 2000 (Stanley)	5 × 0.2-0.21	9 70 13 15	5 × 0.02	BBCH 60-85	Whole fruit	0 3 7 14	0.37 0.32 0.27 0.19	2001/1006133-DU2/08/00 BOSC19E_064 Method: 445/0 Storage period: 7 months
Germany, Limburgerhof 2000 (St. Hubertus)	5 × 0.2	19 28 14 13	5 × 0.02	BBCH 60-81	Whole fruit	0 3 7 14	0.092 0.074 0.057 0.053	2001/1006133-DU4/07/00 BOSC19E_064 Method: 445/0 Storage period: 7 months
Italy, Bologna 1999 (Empress)	5 × 0.2	12 84 14	5 × 0.022	BBCH 61-86	Whole fruit	0 3 6	0.22 0.56 0.18	2001/1000934-9934R BOSC19E_062 Method: 445/0

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
		14				13	0.11	Storage period: 12 months
Italy, Ravenna 1999 (President)	5 × 0.2	12 56 15 13	5 × 0.022	BBCH 61-82	Whole fruit	0 2 7 15	0.14 0.11 0.08 0.06	2001/1000934-9935R BOSC19E_062 Method: 445/0 Storage period: 12 months
Sweden, Bjärred 2000 (Victoria)	5 × 0.2- 0.22	11 28 15 16	5 × 0.02	BBCH 60-85	Whole fruit	0 3 7 14	0.23 0.17 0.11 0.1	2001/1006133-HUS/04/00 BOSC19E_064 Method: 445/0 Storage period: 7 months
Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Orland (CA) 2007 (French)	5 × 0.26	7-8	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	0.15, 0.1 (0.12) 0.1, 0.06 (0.08)	2007/7013460-R070193, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Lindsey (CA) 2007 (Angeleno)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	0.62, 0.59 (0.6) 0.55, 0.57 (0.56)	2007/7013460-R070194, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Fresno (CA) 2007 (Howard Sun)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	<0.05, <0.05 (<0.05) <0.05, <0.05 (<0.05)	2007/7013460-R070195, BOSC19E_061 Method: D9908 Storage period: 7 months Last application: 02.08.2007
USA, Fresno (CA) 2007 (Flavor Rich)	5 × 0.26	7	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1 5 10	0.13, 0.13 (0.13) 0.11, 0.08 (0.095) 0.11, 0.08 (0.095) 0.06, 0.06 (0.06)	2007/7013460-R070196, BOSC19E_061 Method: D9908 Storage period: 7 months Last application: 11.07.2007
USA, Conklin (MI) 2007 (Stanley)	5 × 0.26	7-8	5 × 0.018- 0.14	Up to BBCH 87	Whole fruit	0 1	0.74, 0.79 (0.76) 0.48, 0.57 (0.52)	2007/7013460-R070197, BOSC19E_061 Method: D9908 Storage period: 7 months
USA, Parlier (CA) 2002 (Casselman)	0.003 g/kg	-	-	-	post- harvest spray (high vol.)	0	0.65, 0.67 (0.66)	2005/7004639-02-CA117 BOSC19E_068 Method: D9908 Storage period: 4 months
	0.0028 g/kg	-	-	-	post- harvest spray (low vol.)	0	2.8, 3.0 (2.9)	
	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	0.97, 0.96 (0.96)	
USA, Parlier (CA) 2002	0.0028 g/kg	-	-	-	post- harvest spray (low vol.)	0	0.99, 0.85 (0.92)	2005/7004639-02-CA118 BOSC19E_068 Method: D9908 Storage period: 4 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
	0.067 kg/l	-	-	-	Post- harvest dip with wax	0	0.84, 0.59 (0.72)	

DALA: days after last application

Table 25 Summary information on residues of boscalid in plums (reported in the 2006 JMPR Evaluation)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No.
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 5 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Conklin (MI) 1999 (Stanley)	5 × 0.26	6-8	5 × 0.037	35mm to early maturity	Whole fruit	0 7 14 21 28	<u>0.57</u> 0.55 0.4 0.29 0.23	2001/5000831-99116
	5 × 0.26	6-8	5 × 0.013	35mm to early maturity	Whole fruit	0 7 14 21 28	0.34 0.21 0.27 0.23 0.25	
USA, Porterville (CA), 1999 (July Rosu's)	5 × 0.26	7	5 × 0.051	Fruit matur. to harvest	Whole fruit	0	0.14	2001/5000831-99117
	5 × 0.26	7	5 × 0.013	Fruit matur. to harvest	Whole fruit	0	<u>0.15</u>	
USA, Porterville (CA), 1999 (Angelino)	5 × 0.26	7	5 × 0.046	60mm to harvest	Whole fruit	0	0.17	2001/5000831-99118
	5 × 0.26	7	5 × 0.012	60mm to harvest	Whole fruit	0	<u>0.32</u>	
USA, Chilo (CA) 1999 (French Prune)	5 × 0.26	7	5 × 0.031	30mm to harvest	Whole fruit	0	0.09	2001/5000831-99119
	5 × 0.26	7	5 × 0.016	30mm to harvest	Whole fruit	0	<u>0.1</u>	
USA, Selma (CA) 1999 (Howard Sun)	5 × 0.26	6-8	5 × 0.028	Full size to harvest	Whole fruit	0	0.24	2001/5000831-99120
	5 × 0.26	6-8	5 × 0.014	Full size to harvest	Whole fruit	0	<u>0.25</u>	
USA, Dallas (OR) 1999 (Parsons)	5 × 0.26	6-8	5 × 0.043	Coloring to harvest	Whole fruit	0	0.08	2001/5000831-99308
	5 × 0.26	6-8	5 × 0.014	Coloring to harvest	Whole fruit	0	<u>0.11</u>	
USA, Payette (ID), 2004 (Empress)	5 × 0.26	6-7	5 × 0.027	Coloring to ripe for picking	Whole fruit	0	0.55, 0.54 (<u>0.54</u>)	2005/5000024- RCN2004138

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No.
	kg ai/ha	Inter-val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Canada, Bewick (NS) 2004, (Blufre)	5 × 0.26	6-8	5 × 0.041	50% final size to ripe for picking	Whole fruit	0	0.55, 0.85 (<u>0.7</u>)	2005/5000024-RCN2004139
Canada, Branchton (ON) 2004 (Yellow Plum)	5 × 0.26	6-7	5 × 0.029	50% final size to ripe for picking	Whole fruit	0	0.46, 0.46 (<u>0.46</u>)	2005/5000024-RCN2004140
USA, Nodine (MN) 2004, (Alderman)	5 × 0.26	7	5 × 0.028	60% final size to ripe for picking	Whole fruit	0	0.25, 0.088 (<u>0.17</u>)	2005/5000024-RCN2004141

DALA: days after last application

Table 26 Residues of boscalid in blueberries

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter-val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 4 × 0.26 kg ai/ha, 7 days interval, 0 d PHI)								
USA, Tift 2007 (Brightwell)	4 × 0.41	7	4 × 0.21	Mature	Fruits	0 1 5 10	<u>2.0</u> 1.9 1.9 1.6	2007/7013452-R070217 BOSC19E_072 Method: D9908 Storage period: 4 months
Canada, Lac St.Jean 2007 (Wild Lowbush)	4 × 0.41	7d	4 × 0.21	Mature	Fruits	0 1	<u>5.4</u> 3.7	2007/7013452-R070218 BOSC19E_072 Method: D9908 Storage period: 4 months

DALA: days after last application

Table 27 Summary information on residues of boscalid in blueberries (reported in the 2006 JMPR Evaluation)

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter-val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 4 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Maiden Rock (WI), 1999, (Blue Chop, Highbush)	4 × 0.41	6-7	4 × 0.22	Mature	Fruits	0	1.4, 0.92 (<u>1.2</u>)	2000/5195-99278
USA, Corvallis (OR) 1999, (Blue Crop, Highbush)	4 × 0.41	6-8	4 × 0.11	Mature	Fruits	0	0.49, 1.2 (<u>0.84</u>)	2000/5195-99279
USA, Dundee (NY) 1999, (Blue Ray and Blue Crop, Highbush)	4 × 0.41	6-7	4 × 0.19	Mature	Fruits	0	1.1, 1.4 (<u>1.2</u>)	2000/5195-99328

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
USA, Hixton (WI) 1999, (Berkley, Highbush)	4 × 0.41	6-9	4 × 0.22	Mature	Fruits	0	1.1, 1.5 (<u>1.3</u>)	2000/5195-99329
USA, Chula (GO) 1999 (Tift Blue, Highbush)	4 × 0.41	7	4 × 0.22	Mature	Fruits	0	1.4, 1.5 (<u>1.4</u>)	2000/5195-99330
USA, Pineboro (GO) 1999 (Climax, Highbush)	4 × 0.41	7	4 × 0.22	Mature	Fruits	0	2.2, 2.5 (<u>2.4</u>)	2000/5195-99331
Canada, Riverton 2004 (Wild Lowbush)	4 × 0.4- 0.41	6	4 × 0.15	Mature	Fruits	0	4.3, 4.4 (<u>4.4</u>)	2005/5000144- RCN2004146
USA, Conklin (MI) 2004 (Blue Crop, Highbush)	4 × 0.41- 0.42	6-7	4 × 0.06	Mature	Fruits	0	2.4, 2.8 (<u>2.6</u>)	2005/5000144- RCN2004149
	4 × 0.41- 0.42	6-7	4 × 0.06	Mature	Fruits	0	2.7, 2.6 (2.6)	
USA, Arkansaw (WI) 2004 (Elliot, Highbush)	4 × 0.41- 0.42	7	4 × 0.07	Mature	Fruits	0	3.6, 4.0 (<u>3.8</u>)	2005/5000144- RCN2004151
Canada, Berwick 2004 (Lowbush)	4 × 0.41- 0.42	6-7	4 × 0.06	Mature	Fruits	0	6.6, 7.0 (<u>6.8</u>)	2005/5000144- RCN2004198
	4 × 0.4- 0.42	6-7	4 × 0.06	Mature	Fruits	0	6.3, 7.4 (6.8)	

DALA: days after last application

Table 28 Residues of boscalid in blueberries grown indoors

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: Germany 3 × 0.25 kg ai/ha, 7 day interval, 7 d PHI)								
Germany, Gilten 2009 (Duke)	3 × 0.27	7	4 × 0.027	Mature	Fruits	0 7 10 14 21	16.6 3.1 4.2 0.37 0.83	2010/1224114-AK Lück 0929 BOSC19E_074 Method: L00.00-113 Storage period: 6 months Reduced sample size (25- 180 g)

DALA: days after last application

Table 29 Residues of boscalid in currants grown indoors

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Europe (cGAP: Germany 3 × 0.25 kg ai/ha, 7 day interval, 7 d PHI)								
Germany, Köln 2009 (Ometa)	3 × 0.27	7	4 × 0.027	Mature	Fruits	0 7 10 14 21	5.3 4.8 3.6 3.7 2.1	2010/1224114- AK Lück 0927 BOSC19E_074 Method: L00.00-113 Storage period: 6 months Same location, different glasshouse
	3 × 0.27	7	4 × 0.027	Mature	Fruits	0 7 10 14 21	4.5 3.4 3.5 2.9 1.7	2010/1224114- AK Lück 0928 BOSC19E_074 Method: L00.00-113 Storage period: 6 months Same location, different glasshouse
Germany, Karlsruhe 2009 (Titania)	3 × 0.27	7-8	4 × 0.027	Mature	Fruits	14	2.6	2010/1224114- AK Lück 0930 BOSC19E_074 Method: L00.00-113 Storage period: 6 months

DALA: days after last application

Table 30 Residues of boscalid in raspberries

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 4 × 0.26 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Penn Yau (NY) 1999 (Titau)	4 × 0.41	6	4 × 0.19	Mature	Fruits	0 2 4 6 8	3.3, 2.1 (<u>2.7</u>) 2.5, 2.1 (2.3) 2.3, 1.6 (2.0) 2.0, 1.1 (1.6) 0.96, 1.5 (1.2)	2000/5195-99277 BOSC19E_071 Method: D9908 Storage period: 3 months
USA, Sherwood (OR) 1999 (Meeker)	4 × 0.41	7	4 × 0.2	Mature	Fruits	0	1.6, 1.4 (<u>1.5</u>)	2000/5195-99280 BOSC19E_071 Method: D9908 Storage period: 3 months Last application: 07.07.1999
USA, Sherwood (OR) 1999 (Tulamene)	4 × 0.41	7	4 × 0.2	Mature	Fruits	0	2.4, 1.6 (<u>2.0</u>)	2000/5195-99281 BOSC19E_071 Method: D9908 Storage period: 3 months Last application: 07.07.1999
USA, Nodine (MN) 2004 (Nova)	4 × 0.41- 0.43	7	4 × 0.08	Mature	Fruits	0	3.7, 3.3 (<u>3.5</u>)	2005/5000144-RCN2004143 BOSC19E_073 Method: D9908 Storage period: 6 months

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
USA, Corvallis (OR) 2004 (Caroline)	4 × 0.41- 0.42	7	4 × 0.06	Mature	Fruits	0	2.5, 2.4 (2.4)	2005/5000144-RCN2004144 BOSC19E_073 Method: D9908 Storage period: 6 months
Canada, Abbotsford 2004 (Kilarne)	4 × 0.38- 0.41	7	4 × 0.06	Mature	Fruits	0	3.1, 4.4 (3.7)	2005/5000144-RCN2004145 BOSC19E_073 Method: D9908 Storage period: 6 months

DALT: days after last application

Table 31 Residues of boscalid in avocado

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 2 × 0.33 kg ai/ha, 7 day interval, 0 d PHI)								
USA, Homestead (FL) 2002 (Peterson)	4 × 0.41	6-8	4 × 0.06	Mature	Fruits without stone	0	0.14, 0.17 (0.16)	2006/1045610-02-FL44 BOSC19E_075 Method: D9908 Storage period: 6 months Last application: 10.07.2002
USA, Homestead (FL) 2002 (Booth 8)	4 × 0.41	7	4 × 0.07	Mature	Fruits without stone	0	0.18, 0.19 (0.18)	2006/1045610-02-FL45 BOSC19E_075 Method: D9908 Storage period: 6 months Last application: 27.08.2002
USA, Homestead (FL) 2002 (Peterson)	4 × 0.41	7-8	4 × 0.07	Mature	Fruits without stone	0	0.22, 0.27 (0.24)	2006/1045610-02-FL46 BOSC19E_075 Method: D9908 Storage period: 6 months Last application: 29.08.2002
USA, Woodland (CA) 2002 (Zutano)	4 × 0.41	7	4 × 0.06	Mature	Fruits without stone ^a	0	0.59, 0.42 (0.5)	2006/1045610-02-CA100 BOSC19E_075 Method: D9908 Storage period: 6 months
USA, Orosi (CA) 2002 (Hass)	4 × 0.41	6-7	4 × 0.07	Mature	Fruits without stone ^a	0	0.76, 1.3 (1.0)	2006/1045610-02-CA101 BOSC19E_075 Method: D9908 Storage period: 6 months
USA, Lindcove (CA) 2002 (Bacon)	4 × 0.41	7	4 × 0.07	Mature	Fruits without stone ^a	0	0.38, 0.31 (0.34)	2006/1045610-02-CA102 BOSC19E_075 Method: D9908 Storage period: 6 months
USA, Nipomo (CA) 2002 (Gwen and Bacon)	4 × 0.41	6-7	4 × 0.06	Mature	Fruits without stone ^a	0	0.47, 0.34 (0.4)	2006/1045610-02-CA103 BOSC19E_075 Method: D9908 Storage period: 6 months

DALA: days after last application

^a fruit halves in the field and stone removed

Table 32 Residues of boscalid in mangoes

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Southern America (cGAP: Brazil 2 × 0.024 kg ai/hL, 15 day interval, 7 d PHI)								
Brazil, Londrina 2011 (Tommy Atkins)	2 × 0.45	14	2 × 0.022	BBCH 81	Whole fruits	0 7 14	0.38 <u>0.55</u> 0.13	2011/1226624-G100443 2011/1266277 2011/3008004 2011/3008003 BOSC19E_076, _077; _078 & _079 Method: L0076/01 Storage period: 8 months
Brazil, Anápolis 2011 (Tommy)	2 × 0.45	14	2 × 0.022	BBCH 85	Whole fruits	0 7 14	0.9 <u>0.68</u> 0.54	2011/1226624-G100444 2011/1266277 2011/3008004 2011/3008003 BOSC19E_076, _077; _078 & _079 Method: L0076/01 Storage period: 8 months
Brazil, Sto. Antônio de Posse 2011 (Palmer)	2 × 0.45	14	2 × 0.022	BBCH 85	Whole fruits	7	<u>0.25</u>	2011/1226624-G100445 2011/1266277 2011/3008004 2011/3008003 BOSC19E_076, _077; _078 & _079 Method: L0076/01 Storage period: 8 months
Brazil, Urai 2011 (Palmer)	2 × 0.45	14	2 × 0.022	BBCH 87	Whole fruits	7	<u>1.0</u>	2011/1226624-G100446 2011/1266277 2011/3008004 2011/3008003 BOSC19E_076, _077; _078 & _079 Method: L0076/01 Storage period: 8 months
Brazil, Rolândia 2014 (Tommy Atkins)	2 × 0.24	15	2 × 0.024	BBHCH 79-89	Whole fruit, calculated Control	0 7 14	<0.01 <0.01 0.017 0.018	2015/3002561-G140014 2015/3002961 BOSC19E_080 & _081 Method: L0076/01 Storage period: 9 months Note: fruits separated in peel and pulp in the field. Stone discarded. Trial not considered due to significant residues in control samples.
Brazil, Petrolina 2014 (Palmer)	2 × 0.24	15	2 × 0.024	BBHCH 78-88	Whole fruit, calculated	7	<u>0.1</u>	2015/3002561-G140015 2015/3002961 BOSC19E_080 & _081 Method: L0076/01 Storage period: 9 months Last application: 27.02.2014 Note: fruits separated in peel and pulp in the field. Stone discarded.

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Brazil, Mogi Mirim 2014 (Choc Anao)	2 × 0.24	15	2 × 0.024	BBHCH 79-89	Whole fruit, calculated	7	<u>0.22</u>	2015/3002561-G140022 2015/3002961 BOSC19E_080 & _081 Method: L0076/01 Storage period: 9 months Note: fruits separated in peel and pulp in the field. Stone discarded.
Brazil, Petrolina 2014 (Tommy)	2 × 0.24	15	2 × 0.024	BBHCH 79-89	Whole fruit, calculated	0 7 14	0.54 <u>0.26</u> 0.16	2015/3002561-G140111 2015/3002961 BOSC19E_080 & _081 Method: L0076/01 Storage period: 9 months Last application: 09.07.2014 Note: fruits separated in peel and pulp in the field. Stone discarded.
Brazil, Urai 2014 (Palmer)	0.24	-	0.024	BBHCH 81	Whole fruit, calculated	0 7 14	<0.01 <0.01 <0.01	2015/3002561-G140257 2015/3002961 BOSC19E_080 & _081 Method: L0076/01 Storage period: 9 months Note: fruits separated in peel and pulp in the field. Stone discarded.
	2 × 0.24	15	2 × 0.024	BBHCH 81-85	Whole fruit, calculated	0 7 14	0.027 0.015 <u>0.032</u>	

DALA: days after last application

Whole fruit calculation factor: pulp and peel → whole fruit with stone: 0.7-0.88

Table 33 Residues of boscalid in pomegranate

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Northern America (cGAP: USA 2 × 0.33 kg ai/ha, 7 day interval, 0 d PHI)								
Greece, Nea Magnisia 2017 (Wonderful)	2 × 0.5	5	2 × 0.05	BBCH 87	Whole fruit	0	0.67	2018/1013073-L170329 BOSC19E_082 Method: L0076/01 Storage period: 6 months
						3	0.42	
						7	0.37	
					14	0.24		
					Peel	7	1.0	
14	0.63							
Seeds	7	<0.01						
	14	<0.01						
	14	<0.01						
Greece, Apollonia 2017 (Wonderful)	2 × 0.5	5	2 × 0.05	BBCH 87	Whole fruit	0	1.0	2018/1013073-L170330 BOSC19E_082 Method: L0076/01 Storage period: 6 months
						3	0.89	
						7	0.53	
						14	0.26	
					Peel	7	1.4	
						14	0.84	
					Seeds	7	<0.01	
14	<0.01							

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
Italy, Grottaglie 2017 (Wonderful One)	2 × 0.5	5	2 × 0.05	BBCH 88	Whole fruit	0	1.1	2018/1013073-L140328 BOSC19E_082 Method: L0076/01 Storage period: 6 months
						3	0.94	
						7	0.82	
						14	0.78	
					Peel	7	2.3	
						14	2.1	
						Seeds	7	
14	0.053							
Spain, Tocina 2017 (Acco)	2 × 0.5	5	2 × 0.05	BBCH 85	Whole fruit	0	0.8	2018/1013073-L170327 BOSC19E_082 Method: L0076/01 Storage period: 6 months
						3	0.8	
						7	0.45	
						14	0.46	
					Peel	7	0.63	
						14	0.6	
						Seeds	7	
14	0.13							

DALA: days after last application

Tea

The Meeting received a supervised field trial study conducted by Lenz, C. (2017, BOSC19E_083) on tea. In this study fresh leaves and green tea, dried were sampled. The production of green tea, dried was conducted according to the local practice for each of the regions:

China: fresh leaves were taken through an indoor drying, panning/fixation (high heat exposure of a few minutes to stop further enzyme breakdown) and a second drying.

India: fresh leaves were taken through the steps of steaming (hot water bath), withering, CTC (crush, tear, and curl) and drying.

Japan: fresh leaves were taken through the steps of steaming, fan drying, roasting, and air cooling

Taiwan (Province of China): fresh leaves were taken through the steps of sun drying, steaming, pan frying, and cooling.

Table 34 Residues of boscalid in tea

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
East Asia (cGAP: Japan 2 × Factor 2000 dilution \triangleq 0.0068 kg ai/hl, unspecified interval, 7 day PHI)								
China, Huang Tang 2014 (Fuding Dahao #2)	2 × 0.27	7	2 × 0.009	BBCH 40-43	Fresh leaves	0	8.2	2015/1086962-L140320 BOSC19E_083 Method: L0076/01 Storage period: 12 months
						6	2.1	
						13	<0.01	
						21	0.21	
					Green tea, dried	13	<u>4.1</u>	
Controls:								

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
					Black tea, dried	13	0.042	
China, Zhongyong 2014 (Fuyun #6)	2 × 0.27	7	2 × 0.009	BBCH 40-43	Fresh leaves	0 8 14 22	8.5 0.83 <0.01 0.056	2015/1086962- L140321 BOSC19E_083 Method: L0076/01 Storage period: 12 months
					Green tea, dried	14	<u>1.7</u>	
					Controls: Green tea, dried	14	0.019	
India, Coimbatore 2015 (UPASI-3)	2 × 0.27	7	2 × 0.013	BBCH 40-43	Fresh leaves	0 7 15 22	12 5.5 1.1 0.42	2015/1086962- L140322 BOSC19E_083 Method: L0076/01 Storage period: 12 months Last application: 18.02.2015
					Green tea, dried	15	<u>6.3</u>	
India, Coimbatore 2015 (UPASI-9)	2 × 0.27	7	2 × 0.012	BBCH 40-43	Fresh leaves	0 7 15 22	17 11 1.4 0.62	2015/1086962- L140323 BOSC19E_083 Method: L0076/01 Storage period: 12 months Last application: 18.02.2015
					Green tea, dried	15	<u>6.2</u>	
Japan, Bungo- Ono Shi 2014 (Saemidori)	2 × 0.27	7	2 × 0.012	BBCH 40-43	Fresh leaves	0 7 15 21	33 7.4 2.3 1.9	2015/1086962- L140324 BOSC19E_083 Method: L0076/01 Storage period: 12 months Last application: 27.08.2014
					Green tea, dried	15	<u>5.6</u>	
Japan, Bungo- Ono Shi 2014 (Yabukita)	2 × 0.27	7	2 × 0.012	BBCH 40-43	Fresh leaves	0 7 15 21	37 4.9 2.2 1.9	2015/1086962- L140325 BOSC19E_083 Method: L0076/01 Storage period: 12 months Last application: 27.08.2014
					Green tea, dried	15	<u>7.3</u>	
Taiwan (Province of China), Chiayi 2014 (Ching Shin Oolong)	2 × 0.27	7	2 × 0.013	BBCH 40-43	Fresh leaves	0 7 12 21	8.1 5.7 5.5 3.8	2015/1086962- L140326 BOSC19E_083 Method: L0076/01 Storage period: 12 months Last application: 16.10.2014
					Green tea, dried	12	<u>19</u>	
					Controls: Fresh leaves	7	13	
					Green tea, dried	12	0.14	
Taiwan (Province of China), Chiayi	2 × 0.27	7	2 × 0.01	BBCH 40-43	Fresh leaves	0 7 12	9.2 6.7 7.0	2015/1086962- L140327 BOSC19E_083 Method: L0076/01

Location, Year (variety)	Application				Residues, mg/kg			Report/Trial No., Reference, analytical method, validation data, storage period
	kg ai/ha	Inter- val days	kg ai/hL	Growth stage	Sample	DALA	Boscalid	
2014 (Taiwan No. 27)						21	2.3	Storage period: 12 months Last application: 14.11.2014
					Green tea, dried	12	<u>16</u>	
					Controls: Green tea, dried	12	0.039	

DALA: days after last application

FATE OF RESIDUES DURING PROCESSING

Residues after processing

The fate of boscalid during processing of raw agricultural commodity (RAC) was investigated in tea.

Tea

The transfer of residues of boscalid was investigated in tea by Lenz, C. (2017, BOSC19E_083) in three supervised field trial conducted in China and Taiwan Province of China. The trials were performed at rates of 2×0.54 kg ai/ha (7 day interval) 12–13 day before harvest. Tea leaves collected were processed into black tea following local practice. The black tea was shipped to the laboratory and processed into infusions, instant tea, tea extract, steeped leaves and cooked leaves.

Black tea preparation in China: fresh leaves were taken through the steps of air or fan drying, crushing/rolling (by machine), fermentation, and a second machine drying.

Black tea preparation in Taiwan Province of China: fresh leaves were taken through the steps of sun drying, indoor drying, crushing/rolling (by machine), fermentation, and second drying with a roaster.

The subsequent processing of black tea was conducted according to the following procedures:

Tea infusion: An amount of 1000 g of boiling water was added to 13 g of milled black tea leaves (1.3%). The tea remained in the water for three minutes and was then sieved. Samples were collected from the infusion and the steeped leaves.

Instant tea: An amount of 600 g of boiling water was added to 100 g of milled black tea leaves and cooked for 30 minutes. The cooked leaves were separated from the tea extract (dry matter content approx. 5%) by using a centrifuge and a sieve. A sample of cooked leaves (instant) was taken. The tea extract was concentrated using a rotary evaporator until a dry matter content of approx. 25% was reached (temperature 58 °C, vacuum 100 mbar in the beginning - was increased until 20 to 40 mbar at the end of the concentration). After concentration a sample of the tea extract (dry matter content approx. 25%) was taken. The following substances were added (the amounts varied in dependence on the reached dry matter content of the concentrated tea extract) and stirred for approx. 8 minutes:

50 g Concentrated tea extract (dry matter content approx. 25%)

12 g Silica gel (Becosorb 1000)

12 g Maltodextrin

1.25 g Citric acid

The mixture was added as a thin layer to a sheet metal (height of the layer: approx. 1 to 2 mm) and dried for 20 hours at 42 °C and afterwards for 4 hours at 50 °C. The dry intermediate (approx. 94% dry matter content) was milled and saccharose was added to get instant tea with a dry matter tea content

of approx. 5% (approx. 1 part dry intermediate and 5.5 parts saccharose were mixed). The instant tea was homogenized / milled and a sample was taken.

In the following table the residues of boscalid and the resulting processing factors for tea products are summarized:

Table 35 Summary of boscalid in tea and processed commodities (Lenz, C., 2017, BOSC19E_083) following treatment with 2×0.54 kg ai/ha (13 DALA)

Location, Year (Variety)	Matrix	Boscalid in mg/kg	PF
China, Huang Tang 2014 (Fuding Dahao #2)	Black tea (RAC)	0.41	-
	Infusion	<0.01	<0.02
	Steeped leaves (infusion)	0.084	0.2
	Instant tea	<0.01	<0.02
	Tea extract	0.021	0.05
	Cooked leaves (instant)	0.13	0.32
China, Zhongyong 2014 (Fuyun #6)	Black tea (RAC)	4.5	-
	Infusion	<0.01	<0.002
	Steeped leaves (infusion)	1.4	0.31
	Instant tea	0.031	0.007
	Tea extract	0.33	0.07
	Cooked leaves (instant)	2.4	0.53
Taiwan (Province of China), Chiayi 2014 (Ching Shin Oolong)	Black tea (RAC)	25	-
	Infusion	0.038	0.002
	Steeped leaves (infusion)	6.1	0.24
	Instant tea	0.13	0.005
	Tea extract	1.2	0.05
	Cooked leaves (instant)	9.7	0.39

RAC:raw agricultural commodity

In summary, the following processing factors were derived for processed tea:

Table 36 Summary of processing factors for boscalid in tea

Matrix	Individual PF	Median or best estimate
Infusion	<0.002, 0.002, <0.02	0.002
Steeped leaves (infusion)	0.2, 0.24, 0.31	0.24
Instant tea	0.005, 0.007, <0.02	0.007
Tea extract	0.05, 0.05, 0.07	0.05
Cooked leaves (instant)	0.32, 0.39, 0.53	0.39

APPRAISAL

Boscalid is a systemic fungicide first evaluated by JMPR in 2006 for residues and toxicology as a new active substance. An ADI of 0–0.04 mg/kg bw was established for boscalid, while no ARfD was considered necessary.

The 2006 JMPR recommended the following residue definition for boscalid:

Definition of the residue for compliance with the MRL in plant and animal commodities and for dietary risk assessment in plant commodities: *boscalid*.

Definition of the residue for dietary risk assessment in animal commodities: *sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide (M510F01) including its conjugate, expressed as boscalid*.

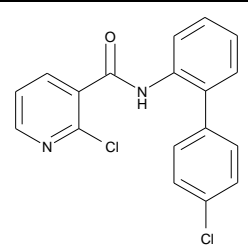
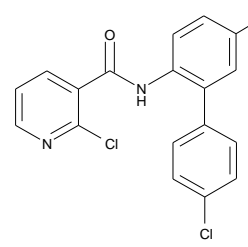
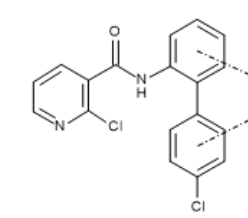
The residue is fat-soluble.

In 2008 and 2010 additional uses (and in 2009 residues in follow crops) were reviewed for residues by the Meeting. Boscalid was scheduled at the Fiftieth Session of the CCPR for the evaluation of additional uses for the Extra 2019 JMPR Meeting.

The current Meeting received new information on use patterns for boscalid in pome fruit, stone fruit, berry fruit, tropical fruit and tea supported by additional plant and animal metabolism studies, field rotational crop studies, analytical methods and recovery data, supervised field trials and studies simulating typical processing conditions.

The current Meeting also received additional data on environmental fate and on corresponding analytical methods in environmental matrices (see evaluation). The Meeting concluded that these data are not directly linked to the current consideration of additional uses on permanent crops and decided to postpone the assessment of the data until the next periodic review of boscalid.

The following abbreviations are used for the metabolites discussed below:

Code Names	Structure	Where found
Boscalid BAS510F		Rat, plants, animals, rotational crops, soil
M510F01		Rat, animals
M510F65		Rat, animals

Plant metabolism

The fate of boscalid in plants was evaluated by the 2006 Meeting following foliar spray application of ^{14}C -diphenyl- or ^{14}C -pyridine-radiolabelled substance to grapes, lettuce and green beans. A detailed assessment of these studies is presented in the 2006 JMPR Report. For the current Meeting, an additional plant metabolism study on green beans was submitted.

The metabolism of ^{14}C -diphenyl-boscalid in common beans was investigated under enclosed conditions by application of three foliar sprays at 0.52 kg ai/ha each. The treatments were performed at the beginning of flowering (BBCH 61, 33 days before harvest), 11 days later (22 days before harvest) and 13 days before harvest (BBCH 75–79). Samples of plants and whole pods were collected 3 days before and 13 days after final treatment. Pods collected at harvest were additionally separated into hulls and green seeds.

In all samples except green seeds, the extraction of radioactivity with methanol, followed by water, was nearly complete (>98% TRR). In green seeds 70% of the TRR was extracted by the solvents

used. TRR levels ranged from 29–52 mg eq/kg in plants, 0.79–1.2 mg eq/kg in whole pods, 0.80 mg eq/kg in hulls and 0.065 mg eq/kg in green seeds.

The identification of the radioactive residues revealed only unchanged boscalid in plants, pods and hulls, representing 97–102% of the TRR. In green seeds, only 17% of the TRR (0.011 mg eq/kg) was identified as boscalid. The majority of the extracted radioactivity (53% TRR) was characterised as five minor components, two of them present up to 0.011 mg eq/kg (up to 17% TRR) and three of them up to 0.006 mgeq/kg (up to 9% TRR).

Post-extraction solids were not investigated and represented 30% TRR in green seeds (0.019 mg eq/kg) and <2% TRR in all other matrices.

The Meeting concluded that parent boscalid is the predominant residue in all plant parts directly treated (plant, whole pods, hulls). In green seeds, it is also present as a major component by proportion, but absolute concentrations are much lower. No metabolites were identified in bean plants, pods or hulls. In green seeds, characterised metabolites were present in minor amounts.

Animal metabolism

The fate of boscalid in lactating goats and laying hens was evaluated by the 2006 Meeting following administration of ¹⁴C-diphenyl-radiolabelled substance. A detailed assessment of these studies is presented in the 2006 JMPR Report. For the current Meeting, an additional metabolism study on laying hens was submitted.

For the investigation of the metabolism of boscalid in laying hens ten animals received a dose of ¹⁴C-pyridin-labelled boscalid equivalent to 12 ppm for 13 consecutive days via capsule administration. Animals were sacrificed approximately 6 hrs after the final dosing. During the whole dosing period eggs and excreta were collected and analysed with pooled tissue samples for each group at the end of the study.

TRR levels found were highest in liver (0.44 mg eq/kg), followed by egg yolk (0.12 mg eq/kg), fat (0.095 mg eq/kg), muscle (0.051 mg eq/kg) and egg white (0.03 mg eq/kg).

Solvent extraction using acetonitrile or methanol released the majority of the residue from all matrices (63–94% TRR). In addition, 2–10% TRR could be released from liver and eggs with water extraction while only 1.4% TRR was additionally released with dichloromethane from liver. Post extraction solids ranged from 6–32% TRR. Their characterisation by enzymatic hydrolysis released most of the radioactivity with protease treatment (22–35% TRR). The pepsin and pancreatin solubilizate contained only minor radioactivity (≤2% TRR).

Parent boscalid was found as a major residue in the extracts of fat (85% TRR), egg white/yolk (34% TRR) and muscle (29% TRR). In liver, only 1.8% of the TRR (0.008 mg eq/kg) were identified as unchanged parent. The major residue in liver extracts was M510F01 representing 35% TRR (0.16 mg eq/kg), which was also present in major proportions in egg white/yolk (27–28% TRR, 0.008–0.034 mg eq/kg) but not in muscle or fat (5–11% TRR, 0.005 mg eq/kg). Additionally, M510F65 (glucuronides of M510F01) was found as a major metabolite, representing 16–32% TRR in egg white/yolk (0.005–0.039 mg eq/kg) and 20% TRR in liver (0.09 mg eq/kg). In egg yolk, the majority of the M510F65 was recovered after enzymatic hydrolysis of the post-extraction solids (24% TRR, 0.029 mg eq/kg).

The metabolic pathway of ¹⁴C-pyridin-labelled boscalid in laying hens was limited. In the first step, hydroxylation at the diphenyl-ring was observed forming M510F01. In a second step, glucuronidation occurs into M510F65. All metabolites identified in laying hens were also found in the rat.

Environmental fate

The current Meeting received one additional field rotational crop study involving application of 2.1 kg ai/ha to bare soil at four sites in Europe. Zucchini, cucumbers, tomatoes and lettuce were planted as rotational crops 30 days after treatment. In all fruiting vegetables (cucumber, zucchini and tomato), no

residues above the LOQ of 0.01 mg/kg were found (66–140 days after treatment). Only lettuce contained quantifiable residues ranging from 0.014–0.12 mg/kg.

The Meeting noted that boscalid residues found in rotated lettuce (up to 0.12 mg/kg) surpass findings in rotated Brassica vegetables (up to 0.05 mg/kg). However, the Meeting confirmed its previous conclusion that residues taken up from soil add insignificantly compared to directly treated leafy vegetables (maximum residue level recommendation of the 2010 JMPR was 40 mg/kg for leafy vegetables).

Methods of analysis

The current Meeting received additional analytical methods for the determination of boscalid in plant commodities and additional concurrent recovery information for method 471/0 evaluated by the 2006 Meeting, measuring boscalid and M510F01 (incl. conjugates) in animal matrices.

For plant matrices, three new single residue analytical methods were provided involving initial extraction with methanol/water/hydrochloric acid (70:25:5) or acetonitrile, followed by partitioning against cyclohexane or hexane, respectively. The first solvent system does not require further clean-up while the acetonitrile/hexane system includes a C₁₈- and Silica Gel-solid-phase extraction step. All methods involve analysis by LC-MS/MS at LOQs of 0.01 mg/kg for high water, high starch and high acid content matrices as well as for hops, spices and herbal infusions. For high oil content matrices, a LOQ of 0.05 mg/kg was validated.

In addition, the QuEChERS-Multimethod was successfully tested in high water, high acid and high starch content matrices at a LOQ of 0.01 mg/kg for boscalid.

In animal matrices, additional concurrent recovery data were submitted for method 471/0. LOQs of 0.01 mg/kg were validated each for boscalid and M510F01 (incl. conjugates) in bovine tissues, milk, cream and eggs.

Definition of the residue

The current Meeting received new data on the metabolism of boscalid in green beans and laying hens.

Following foliar application to green beans, boscalid was the only residue identified. The Meeting therefore confirms its previous recommendation of boscalid for compliance with the MRL and for the estimation of the dietary exposure for plant commodities.

In laying hens parent boscalid was found as a major residue in fat (85% TRR), egg white/yolk (34% TRR) and muscle (29% TRR) and in lower proportions in the liver (1.8% TRR). The Meeting confirms its previous recommendation of boscalid for compliance with the MRL for animal commodities and also on the fat-solubility of the residue.

Besides boscalid, its hydroxylated metabolite M510F01 and glucuronides thereof (M510F65) were the only components identified in hen matrices. Therefore the Meeting confirmed its previous recommendation for the estimation of the dietary exposure to be the sum of boscalid and M510F01 (2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide) including its conjugate, expressed as boscalid.

Based on new information submitted, the present Meeting assessed the toxicity of M510F49 and considered it to be covered by the ADI for the parent substance. Since this metabolite was exclusively found in hen liver hydrolysate representing 12% of the TRR, no inclusion into the residue definition for compliance with the MRL or for the estimation of the dietary exposure is required.

Results of supervised residue trials on crops

The Meeting received supervised trial data for applications of boscalid on pome fruit, stone fruit, bush berries, cane berries, avocado, mango, pomegranate and tea, respectively.

Pome fruit

For boscalid, the 2006 JMPR Meeting recommended a maximum residue level of 2 mg/kg and estimated an STMR value of 0.365 mg/kg for apples based on a GAP from the UK (4×0.2 kg ai/ha, 7 day PHI). The current Meeting received new GAP information with supporting supervised field trials on apples and pears.

Boscalid is registered in the USA for the use pome fruits with a critical GAP involving four foliar sprays of 0.33 kg ai/ha each (7 day interval) and a PHI of 0 days.

Supervised field trials conducted in the USA on apples and pears were submitted which matched the individual application rates, their interval and the PHI, but six instead of four treatments were conducted.

In absence of decline data from Northern America on pome fruits, the Meeting decided to use decline trials from Europe reported by the current and by the 2006 JMPR, which were conducted at growth stages comparable to the US GAP. In total, 31 trials on apples and eight trials on pears were identified with reported residues at 0 days and sampling intervals up to 29 days. Based on first-order kinetics, decline rates of $k=-0.0197$ for apples and $k=-0.0307$ for pears were estimated.

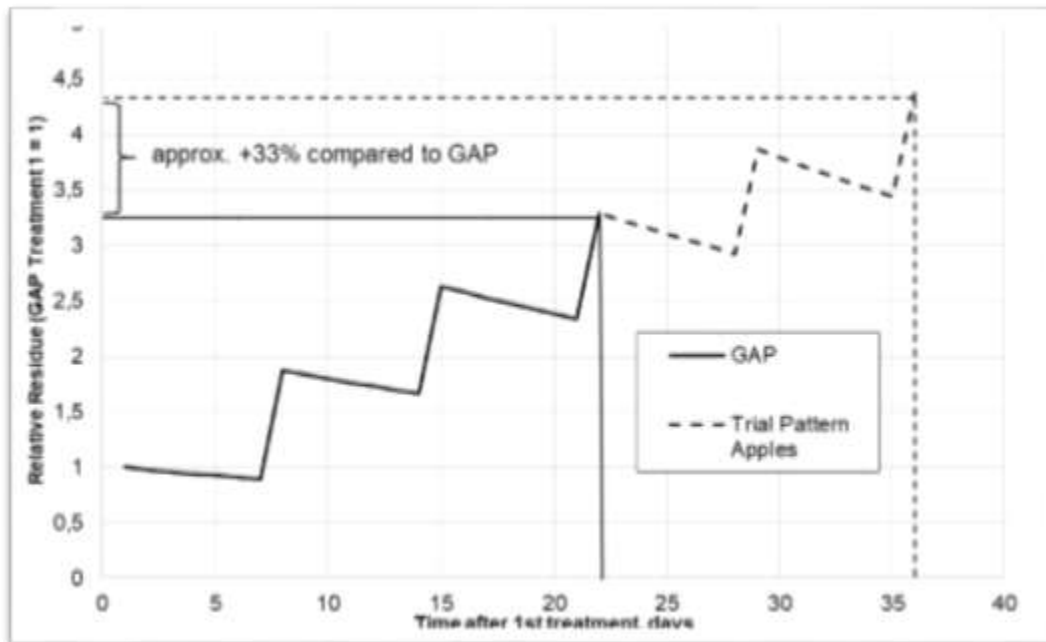


Figure 1 Anticipated residues at GAP vs Field trials (Boscalid – Apple)

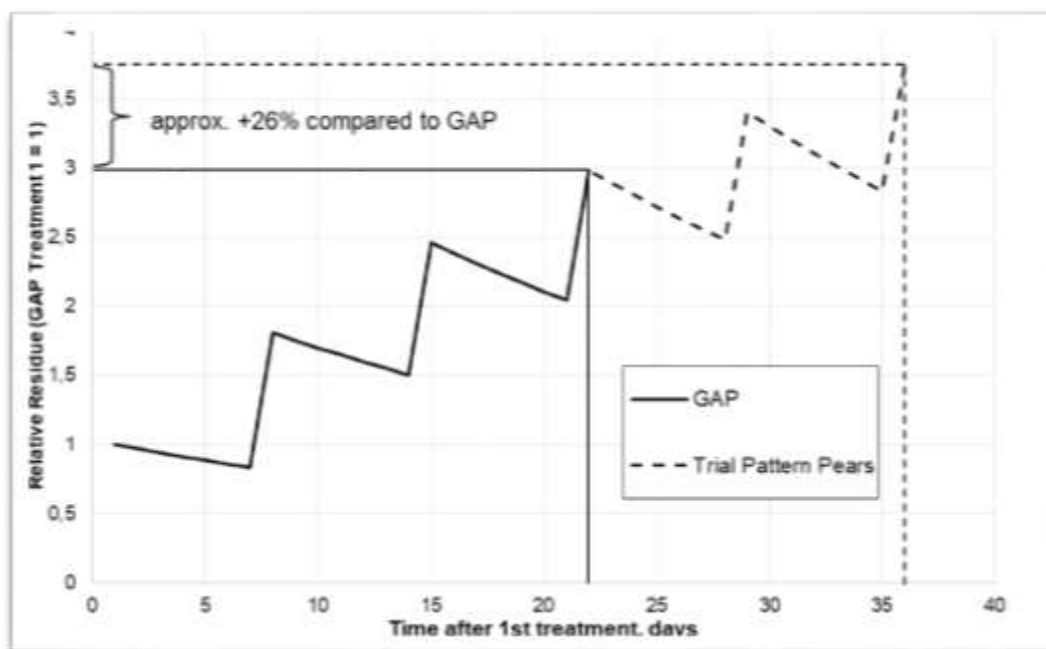


Figure 2 Anticipated residues at GAP vs Field trials (Boscalid – Pear)

The Meeting concluded that the supervised field trial data submitted for apples and pears from the USA overestimate the residue according to the US GAP by more than +25% and cannot be used to estimate maximum residue levels in pome fruits. The Meeting also concluded that proportional adjustment of these trials is inappropriate due to the deviating treatment regime compared to the critical GAP from the USA.

Boscalid is also registered in the Czech Republic for the use on pome fruits with a maximum GAP involving four foliar sprays of 0.2 kg ai/ha each (8 day interval) and a PHI of 7 days.

New supervised field trials conducted in Europe on pears approximating this GAP were submitted to the Meeting. In addition, residue data on apples assessed by the 2006 JMPR against a comparable GAP from the UK were considered.

Residues of boscalid in apples submitted to the 2006 JMPR were (n=22): 0.15, 0.19, 0.2, 0.24, 0.29, 0.29, 0.3, 0.32, 0.32, 0.34, 0.36, 0.37, 0.39, 0.42, 0.42, 0.43, 0.51, 0.53, 0.55, 0.65, 0.86, 1.2 mg/kg.

Residues of boscalid in pears were (n=8): 0.086, 0.11, 0.16, 0.29, 0.33, 0.39, 0.48, 1.3 mg/kg.

The Meeting noted that residues in apples and pears are not significantly different, which was confirmed by the Mann-Whitney-U Test, and decided to combine the datasets.

Residues of boscalid in apples and pears were (n=30): 0.086, 0.11, 0.15, 0.16, 0.19, 0.2, 0.24, 0.29, 0.29, 0.29, 0.3, 0.32, 0.32, 0.33, 0.34, 0.36, 0.37, 0.39, 0.39, 0.42, 0.42, 0.43, 0.48, 0.51, 0.53, 0.55, 0.65, 0.86, 1.2, 1.3 mg/kg (italic = pear residues).

Based on the combined dataset for apples and pears, the Meeting estimated a maximum residue level of 2 mg/kg and a STMR value of 0.35 mg/kg for boscalid in pome fruit.

The Meeting withdraws its previous recommendation of 2 mg/kg for boscalid in apples.

Stone fruit

The 2006 JMPR Meeting estimated a maximum residue level of 3 mg/kg and a STMR value of 1.21 mg/kg for boscalid in stone fruit based on a GAP from the USA (5×0.26 kg ai/ha, 0 day PHI). The current Meeting received new GAP information for stone fruit with supporting supervised field trials on cherries, peaches and plums.

Boscalid is registered in Austria for use on stone fruits with a maximum GAP involving three foliar sprays of 0.19 kg ai/ha each (10 day interval) and a PHI of 7 days.

Supervised field trials conducted in Europe on cherries were newly submitted approximating the GAP from Austria. Although treated at intervals slightly longer than the cGAP, the Meeting considered this deviation as insignificant since boscalid residues remain stable on treated fruits.

For peaches and plums, new supervised field trials from Europe were submitted involving four or five instead of three sprays at 0.2 kg ai/ha. However, the Meeting noted that the first sprays were conducted at flowering and/or beginning of fruit development, not contributing to the final residue at harvest. Therefore, the Meeting concluded that the treatment regime used in the submitted trials approximates the Austrian GAP and that the data can be used for an assessment.

Residues of boscalid in cherries were (n=16): <0.05, < 0.05, 0.052, 0.088, 0.096, 0.14, 0.14, 0.16, 0.22, 0.36, 0.37, 0.39, 0.47, 0.66, 0.7, 1.3 mg/kg.

Residues of boscalid in peaches were (n=8): 0.05, 0.15, 0.17, 0.21, 0.21, 0.29, 0.35, 0.35 mg/kg.

Residues of boscalid in plums were (n=10): 0.057, 0.07, 0.08, 0.11, 0.13, 0.15, 0.18, 0.23, 0.27, 0.45 mg/kg.

Boscalid is registered in the USA for use on stone fruits with a critical GAP involving five foliar sprays of 0.26 kg ai/ha each (7 day interval) and a PHI of 0 days.

New supervised field trials conducted in Canada and in the USA on cherries, peaches and plums approximating the GAP from the USA were submitted. In addition, the current Meeting considered residue data on stone fruit evaluated by the 2006 JMPR against the GAP from the USA.

Residues of boscalid in cherries were (n=14): 0.055, *0.76, 1.0, 1.2, 1.2, 1.4, 1.5, 1.5, 1.5, 1.5, 1.6, 1.6, 2.6, 2.6* mg/kg.

Residues of boscalid in peaches were (n=19): *0.19, 0.32, 0.4, 0.42, 0.48, 0.49, 0.49, 0.52, 0.6, 0.60, 0.64, 0.71, 0.73, 0.75, 0.78, 0.79, 1.0, 1.2, 3.6* mg/kg.

Residues of boscalid in plums were (n=15): <0.05, *0.1, 0.11, 0.12, 0.13, 0.15, 0.17, 0.25, 0.32, 0.46, 0.54, 0.57, 0.6, 0.7, 0.76* mg/kg.

(italic = 2006 residue data)

The Meeting noted that the US GAP for stone fruit results in higher residues than the Austrian GAP and decided to explore the possibility for a group recommendation based on it. However, median residues differ by more than a factor of 5, suggesting significant differences in residues between the three commodities investigated. Therefore, the Meeting decided to base its recommendation on the individual sub-groups of cherries, plums and peaches.

The Meeting estimated maximum residue levels and STMR values for boscalid of 5 mg/kg and 1.5 mg/kg for cherries (subgroup 003A) and of 4 mg/kg and 0.6 mg/kg for peaches (subgroup 003C), respectively.

The Meeting also estimated a maximum residue level of 1.5 mg/kg and a STMR value of 0.25 mg/kg for plums (subgroup 003B), because of the significantly lower residue population in plums compared to other members of the stone fruit group and due to the availability of a specific subgroup for plums.

The Meeting withdraws its previous recommendation of 3 mg/kg for boscalid in stone fruit.

Berries and other small fruits, except strawberries and grapes

For boscalid, the 2006 JMPR Meeting recommended a maximum residue level of 10 mg/kg and estimated a STMR value of 2.53 mg/kg for berries and other small fruits, except strawberries and grapes based on a US GAP (4×0.4 kg ai/ha, PHI 0 days). The current Meeting received new GAP information for bush berries and cane berries with supporting supervised field trials.

Boscalid is registered in the USA for use on bush berries and cane berries with a maximum GAP identical to the one considered by the 2006 Meeting involving four foliar sprays of 0.4 kg ai/ha each (7 day interval) and a PHI of 0 days.

Two new supervised field trials conducted in Canada and the USA on blueberries were submitted to the Meeting approximating the GAP from the USA. In addition, supervised field trials on blueberries and caneberries were evaluated by the 2006 Meeting against the same GAP.

Residues of boscalid in blueberries were (n=12): 0.84, 1.2, 1.2, 1.3, 1.4, 2.0, 2.4, 2.6, 3.8, 4.4, 5.4, 6.8 mg/kg (*italic=new trial data*).

Residues of boscalid in raspberries were (n=6): 1.5, 2.0, 2.4, 2.7, 3.5, 3.7 mg/kg.

The Meeting noted that residues in blueberries and raspberries were not significantly different (confirmed by Whitney-Mann-U Test) and decided to combine the data for a group recommendation.

Combined residues of boscalid in blueberries and raspberries were (n=18): 0.84, 1.2, 1.2, 1.3, 1.4, 1.5, 2.0, 2.0, 2.4, 2.4, 2.6, 2.7, 3.5, 3.7, 3.8, 4.4, 5.4, 6.8 mg/kg.

The Meeting noted that the OECD MRL Calculator result for the combined dataset is 10 mg/kg, which is covered by the previous recommendation. The Meeting confirmed its previous recommendation for boscalid in small fruits and berries, except strawberry and grapes.

Avocado

Boscalid is registered for use on tropical fruits (including avocado) in the USA with a maximum GAP involving two foliar sprays of 0.33 kg ai/ha each (7 day interval) and a PHI of 0 days.

Supervised field trials conducted in the USA on avocado were submitted involving four instead of two treatments (7 day interval) with higher individual rates per treatment than the GAP (0.41 kg ai/ha vs. 0.33 kg ai/ha).

The Meeting concluded that the supervised field trial data submitted was conducted at significantly more critical conditions (>+25%) than the US GAP and decided that the data is insufficient for a recommendation.

Mango

The critical GAP for boscalid in mangoes is from Mexico, involving two foliar sprays at 0.3 kg ai/ha each (7 day interval) with a PHI of 0 days. Two supervised field trials from Brazil approximating this GAP were submitted.

Residues of boscalid in mango (whole fruits, calculated) approximating the Mexican GAP were (n=2): 0.032 and 0.54 mg/kg.

The Meeting concluded that two trials are insufficient for a recommendation based on the Mexican GAP.

The critical GAP for boscalid on mango in Brazil is two foliar sprays of 0.024 kg ai/hl each (15 day interval) with a PHI of 7 days.

Supervised field trials conducted in Brazil were submitted approximating the GAP. In some trials, the stone was removed already in the field. Since metabolism information indicates that boscalid is stable both in primary plants and rotational crops, in freezer storage and during simulated hydrolysis, the Meeting decided that no significant impact on the residue in the remaining fruit has to be expected from the procedure in the field.

Residues of boscalid in mango (whole fruits, calculated) approximating Brazilian GAP were (n=8): 0.032, 0.1, 0.22, 0.25, 0.26, 0.55, 0.68, 1.0 mg/kg.

Based on the dataset for mango according to the Brazilian GAP, the Meeting estimated a maximum residue level of 2 mg/kg and a STMR value of 0.255 mg/kg for boscalid in mangoes.

Pomegranate

Boscalid is registered in Turkey for use on pomegranates with a maximum GAP involving three foliar sprays of 0.0126 kg ai/hl each (bud formation, end of flowering (loss of calix) and close to harvest) without specified PHI.

Supervised field trials on pomegranate from Europe were submitted, involving two applications directly before harvest at a 5 day interval.

The Meeting concluded that these trials do not match the GAP from Turkey.

Tea, green, black (black, fermented and dried)

Boscalid is registered in Japan for use on tea with a maximum GAP involving two foliar sprays of a factor 2000 diluted product (WG formulation, 13.6% boscalid, calculated: 0.0068 kg ai/hL) each corresponding to a maximum calculated rate of 0.27 kg ai/ha in combination with a PHI of 7 days.

The Meeting received eight supervised trials from China, India, Japan and Taiwan Province of China on tea approximating the highest calculated rate per hectare according to GAP.

Based on the calculated maximum treatment rate of 0.27 kg ai/ha the estimated residues in dried green tea were (n=8): 1.7, 4.1, 5.6, 6.2, 6.3, 7.3, 16, 19 mg/kg.

Based on the dataset for tea according to the Japanese GAP, the Meeting estimated a maximum residue level of 40 mg/kg and a STMR value of 6.25 mg/kg for tea, green, black (black, fermented and dried).

Fate of residues during processing

Processing factors for the commodities considered at this Meeting are summarized below based on the estimations of the 2006 JMPR.

Raw commodity	Processed commodity	Boscalid	
		Median or best estimate processing factor	STMR-P (mg/kg)
Apple (STMR:0.35 mg/kg)	Wet apple pomace	6.06	2.121
	Juice	0.08	0.028
Plums (STMR:0.25 mg/kg)	Dried prunes	2.8	0.7
	Puree	1.95	0.49
Tea, black (STMR=6.25 mg/kg)	Infusion	<0.002, <u>0.002</u> , <0.02	0.0125
	Instant tea	0.005, <u>0.007</u> , <0.02	0.044

Based on a maximum residue level of 1.5 mg/kg for plums the Meeting estimated a maximum residue level of 5 mg/kg for boscalid in prunes, dried to replace its previous recommendation of 10 mg/kg.

Residues in animal commodities

The only feed commodity affected by the current recommendations is dry apple pomace, which was already considered by all previous Meetings for boscalid residues. Since the new recommendation for boscalid in pome fruit is slightly lower than the previous recommendation for apples (2006: STMR 0.365 mg/kg for apples, 2019: 0.35 mg/kg for pome fruit), no re-calculation of the livestock animal dietary burden is necessary.

RECOMMENDATIONS

On the basis of the data obtained 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 for plant and animal commodities and dietary risk assessment for plant commodities: *boscalid*.

Definition of the residue for dietary risk assessment for animal commodities: *sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide (M510F01) including its conjugate, expressed as boscalid*.

The residue is fat-soluble.

CCN	Commodity	Recommended Maximum residue level (mg/kg)		STMR or STMR-P mg/kg
		New	Previous	
FP 0226	Apple	W	2	-
003A	Cherries (subgroup)	5	-	1.5
FI 0345	Mango	2	-	0.255
003C	Peaches (subgroup)	4	-	0.6
003B	Plums (subgroup)	1.5	w	0.25
FP 0009	Pome fruit	2	-	0.35
DF 0014	Prunes, dried	5	10	0.7
FS 0012	Stone fruit	W	3	-
DT 1114	Tea, green, black (black, fermented and dried)	40	-	6.25
	Apple, juice			0.028
	Dried prunes			0.7
	Plum, puree			0.49
	Tea, infusion			0.0125
	Tea, instant tea			0.044

Additional values used in estimating livestock dietary burdens.

Codex classification	Commodity	Median residue (-P) (mg/kg)	Highest residue (-P) (mg/kg)
	Apple, wet pomace	2.121	-

DIETARY RISK ASSESSMENT

Long-term dietary exposure

The ADI for boscalid is 0–0.04 mg/kg bw. The International Estimated Daily Intakes (IEDIs) for boscalid were estimated for the 17 GEMS/Food Consumption Cluster Diets using the STMR or STMR-P values estimated by the JMPR. The results are shown in Annex 3 of the 2019 Extra JMPR Report.

The IEDIs ranged from 10–60% of the maximum ADI. The Meeting concluded that long-term dietary exposure to residues of boscalid from uses considered by the JMPR is unlikely to present a public health concern.

Acute dietary exposure

The 2006 JMPR decided that an ARfD for boscalid was unnecessary. The Meeting therefore concluded that the acute dietary exposure to residues of boscalid from the uses considered is unlikely to present a public health concern.

Assessment of metabolites using the threshold of toxicological concern (TTC) approach

The metabolite M510F47 could be assessed using the TTC approach (Cramer Class III threshold of 1.5 µg/kg bw per day). Since this metabolite was not identified in food or feed commodities, the Meeting concluded that it is unlikely to present a public health concern.

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Code	Author	Year	Title, Institute, Report reference
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