BOSCALID (221)

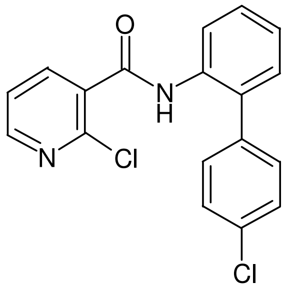
First draft prepared by Dr Yibing He, Institute for the Control of Agrochemicals, Beijing, China.

EXPLANATION

Boscalid is a new fungicide used to control a range of plant pathogens in broadacre and horticultural crops. It was advanced to the 2006 JMPR schedule of new compounds by the 38th session of the CCPR. The manufacturer has submitted information on physical and chemical properties, plant and animal metabolism, environmental fate, analytical mehods, storage stability, good agricultural practices, supervised field trials, processing and livestock feeding.

IDENTITY

ISO common name:	boscalid
Chemical name	
IUPAC name:	2-Chloro-N-(4'-chlorobiphenyl-2-yl)nicotinamide
CAS:	3-Pyridinecarboxamide, 2-chloro-N-(4'-chloro[1,1'-biphenyl]-2-yl)-
CAS Registry No:	188425-85-6
CIPAC No:	not assigned
Synonyms and trade names:	BAS 510 F, Nicobifen
Structural formula:	



Molecular formula:	$C_{18}H_{12}Cl_2N_2O$
Molecular weight:	343.21

PHYSICAL AND CHEMICAL PROPERTIES

Pure active ingredient:

Property	Result	Ref
Appearance (purity 99.7%)	White crystalline solid	Daum A., 1999, 1999/10991
Odour (purity 99.7%)	Odourless	Daum A., 1999, 1999/10991
Vapour pressure (purity 99.7%):	7×10^{-9} hPa at 20°C 2×10^{-8} hPa at 25°C	Käestel R., 1999, 1999/10203
Henry’s law constant	5.178×10^{-8} kPa·m³/mol	Ohnsorge U., 2000, 2000/1001009 ,
Boiling point (purity 99.7%)	Decomposition is observed at about 300 °C.	Daum A., 1999, 1999/10991

Property	Result	Ref
Melting point (purity 99.7%)	142.8 - 143.8°C	Daum A., 1999, 1999/ 10991
Octanol-water partition coefficient:	912 at a pH of 7.0 - 7.2	Daum A., 1998, 1998/11082
Solubility in water at 20°C:	4.64 ± 0.06 mg/L (in deionized water at a pH of 6.0). There is no dissociation in water; therefore pH dependence on solubility is not applicable.	Daum A., 1998, 1998/10961
Solubility in organic solvents at 20°C (purity of 99.4%):	Acetone: 160–200 g/L Acetonitrile: 40–50 g/L Dichloromethane: 200–250 g/L N,N-Dimethylformamide: > 250 g/L Ethyl acetate: 67–80 g/L n-Heptane: < 10 g/L Methanol: 40–50 g/L 1-Octanol: < 10 g/L Olive oil: < 10 g/L 2-Propanol: < 10 g/L Toluene: 20–25 g/L	Daum A., 1998, 1998/ 10953
Relative density (purity 99.7%)	1.381 g/cm^3 at room temperature	Käestel R., 1999, 1999/ 10203
Dissociation constant in water	The test substance does not dissociate in deionized water (titration method, conc. of 20 mg/L [0.058 mmol/L], 20°C). Thus, no dissociation constant (pK_a) has been reported.	Daum A., 1998, 1998/10967
Hydrolysis (sterile solution)	Boscalid is stable in aqueous solution in the dark at 50°C (pH 4, pH 7 and pH 9) for 5 days and at 25°C (pH 5, pH 7 and pH 9) for 30 days. No DT_{50} values were determined, neither for 50°C nor for 25°C, for they exceed twice the duration of the study. Therefore no DT_{50} value for 20°C was calculated according to the Arrhenius equation.	Goetz von N., 1999, 1999/ 11285
Photolysis in water	Boscalid is stable in direct aqueous photolysis for 15 days. In the dark control, likewise, no degradation was observed. No DT_{50} value was determined for it exceeds twice the duration of the study.	Goetz N. von, 1999, 1999/11804

FORMULATIONS

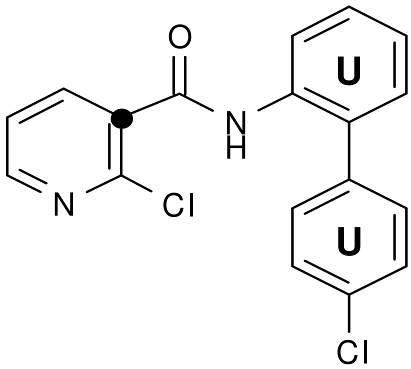
Boscalid is available in the following formulations:

Formulation	Content of active ingredients	Trade names
WG	500 g/kg boscalid	Cantus, Cantus WG, Filan, Pictor Pro
	252 g/kg boscalid 128 g/kg pyraclostrobin	Bellis, Bellis 38 WG, Bellis WG, Pristine, Cabrio C
	136 g/kg boscalid 68 g/kg pyraclostrobin	Bellis Plus, Naria
WG	267 g/kg boscalid	Signum, Signum 33 WG, Signum

Formulation	Content of active ingredients	Trade names
	67 g/kg pyraclostrobin	WG
SE	700 g/kg boscalid	Emerald, Endura, Lance WDG Fungicide, Cadence
SC	200 g/L boscalid 200 g/L dimoxystrobin	Cantus Flüssig, Pictor
	200 g/L boscalid 100 g/L Kresoxim-methyl	Collis
	233 g/L boscalid 67 g/L epoxyconazole	Tracker, Splice, Venture, Champion

METABOLISM AND ENVIRONMENTAL FATE

The Meeting received information on animal and plant metabolism and environmental fate studies which used boscalid labelled at the 3-pyridine carbon or uniformly labelled in the diphenyl moiety.

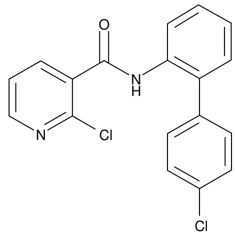


U = diphenyl label

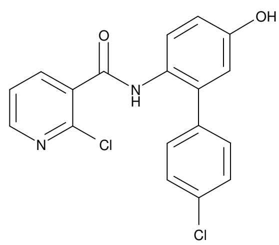
● = 3-pyridine label

Structures, names and codes for boscalid and its metabolites in animal, plant and environmental fate studies are summarized below.

boscalid
2-chloro-N-(4'-chlorobiphenyl-2-yl)nicotinamide

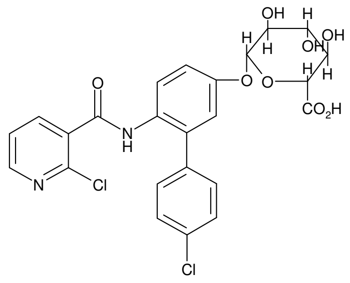


M510F01
2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide



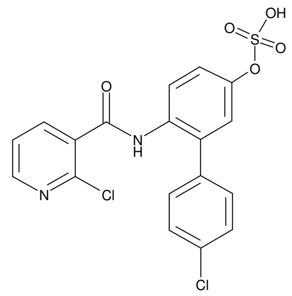
M510F02

4'-chloro-6-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-3-yl glycopyranosiduronic acid



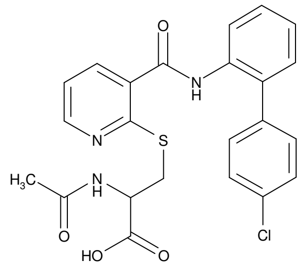
M510F03

4'-chloro-6-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-3-yl hydrogen sulfate



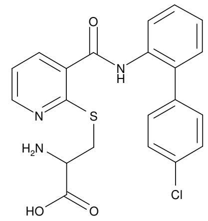
M510F04

N-acetyl(3-{[(4'-chlorobiphenyl-2-yl)amino]carbonyl}-2-pyridinyl)cysteine



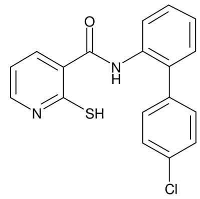
M510F05

(3-{[(4'-chlorobiphenyl-2-yl)amino]carbonyl}-2-pyridinyl)cysteine



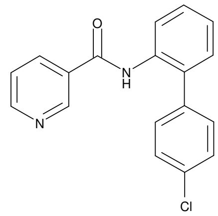
M510F06

N-(4'-chlorobiphenyl-2-yl)-2-sulfanylnicotinamide



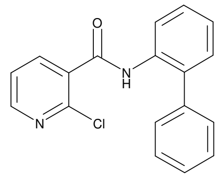
M510F08

N-(4'-chlorobiphenyl-2-yl)nicotinamide

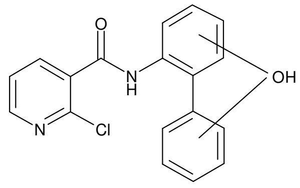


M519F09

N-biphenyl-2-yl-2-chloronicotinamide



M510F10
2-chloro-N-(4’-chloro-?-hydroxybiphenyl-2-yl)nicotinamide



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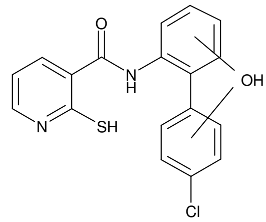
N-(4'-chloro-?-hydroxybiphenyl-2-yl)-2-sulfanylnicotinamide



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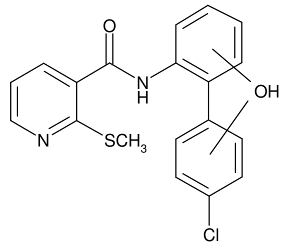
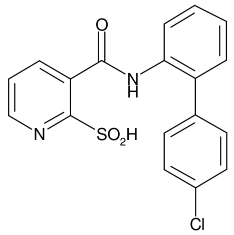
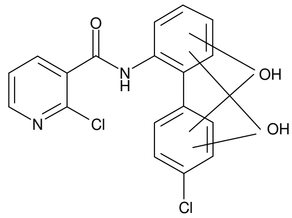
N-(4'-chloro-?hydroxybiphenyl-2-yl)-2-methylsulfanylnicotinamide



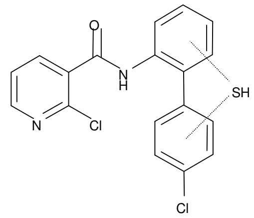
M510F13
3-{[(4'-chlorobiphenyl-2-yl)amino]carbonyl}-2-pyridinesulfinic acid



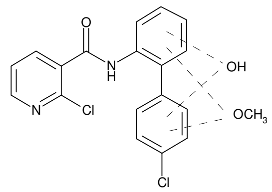
M510F14
2-chloro-N-(4’-chloro-?-dihydroxybiphenyl-2-yl)nicotinamide



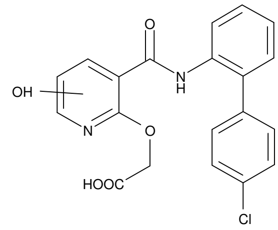
M510F15
2-chloro-N-(4’-chloro-?-sulfanylbiphenyl-2-yl)nicotinamide



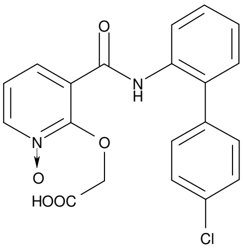
M510F16
2-chloro-N-(4’-chloro-?-hydroxy-?-methoxybiphenyl-2-yl)nicotinamide



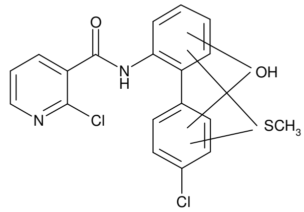
M510F18
[(3-{[(4'-chlorobiphenyl-2-yl)amino]carbonyl}-?-hydroxy-2-pyridinyl)oxy]acetic acid



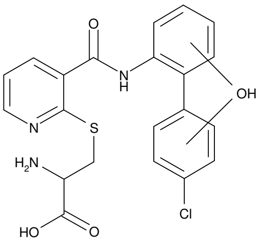
M510F19
[(3-{[(4'-chloro[1,1'-biphenyl]-2-yl)amino]carbonyl}-?-hydroxy-1-oxido-2-pyridinyl)oxy]acetic acid



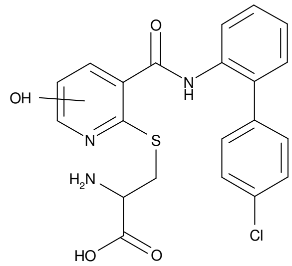
M510F20
2-chloro-N-(4’-chloro-?-hydroxy-?-methylsulfanylbiphenyl-2-yl)nicotinamide



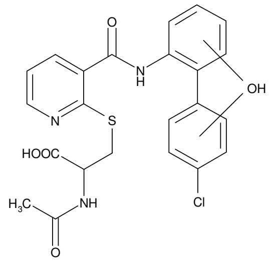
M510F22
(3-{[(4'-chloro-?-hydroxybiphenyl-2-yl)amino]carbonyl}-2-pyridinyl)cysteine



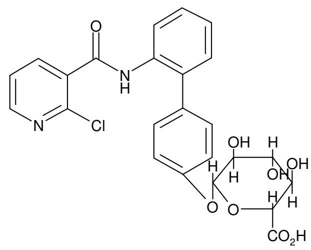
M510F23
(3-{[(4'-chlorobiphenyl-2-yl)amino]carbonyl}-?-hydroxy-2-pyridinyl)cysteine



M510F28
N-acetyl(3-{[(4'-chloro-?-hydroxybiphenyl-2-yl)amino]carbonyl}-2-pyridinyl)cysteine

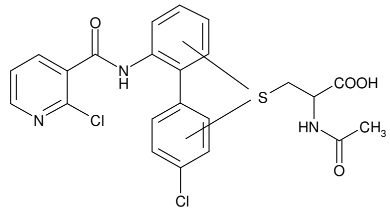


M510F29
2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-4-yl glycopyranosiduronic acid



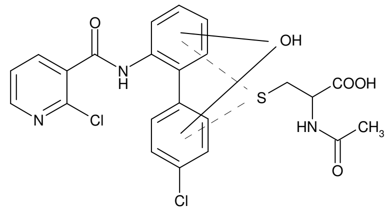
M510F32

N-acetyl(4-chloro-2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-?-yl)cysteine



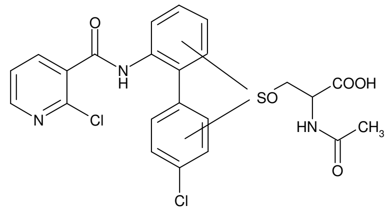
M510F33

N-acetyl(4-chloro-2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}-?-hydroxybiphenyl-?-yl)cysteine



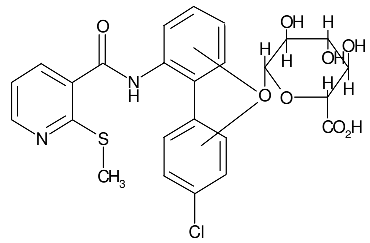
M510F34

N-acetyl-3-[(4-chloro-2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-?-yl)sulfinyl]alanine



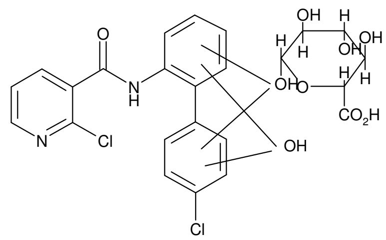
M510F39

4-chloro-2'-{[(2-methylsulfanyl-3-pyridinyl)carbonyl]amino}biphenyl-?-yl glycopyranosiduronic acid



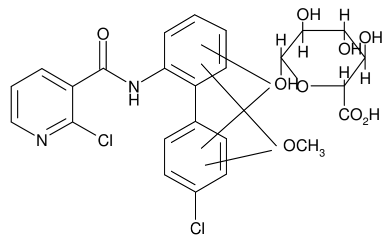
M510F40

2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}-4-chloro-?-hydroxybiphenyl-?-yl glycopyranosiduronic acid



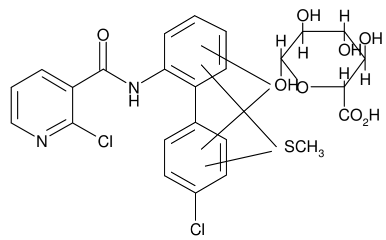
M510F41

2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}-4-chloro-?-methoxybiphenyl-?-yl glycopyranosiduronic acid

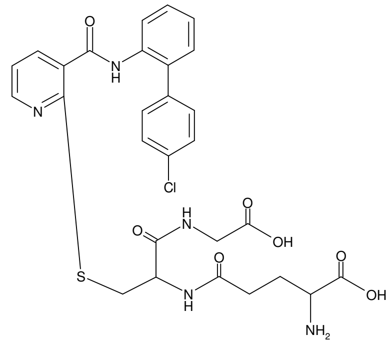


M510F42

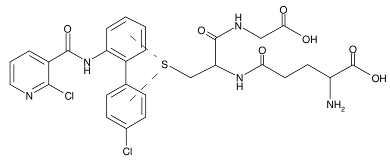
2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}-4-chloro-?-methylsulfanylbiphenyl-?-yl glycopyranosiduronic acid



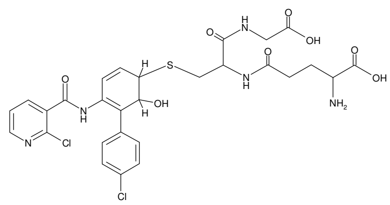
M510F43
N-(4'-chlorobiphenyl-2-yl)-2-glutathionylnicotinamide



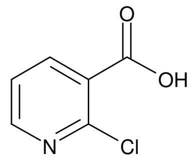
M510F45
2-chloro-N-(4’-chloro-?-glutathionylbiphenyl-2-yl)nicotinamide



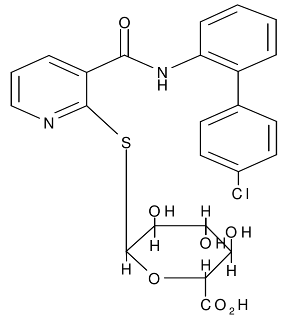
M510F46
or isomer
N^5-(2-[(carboxymethyl)amino]-1-{[(5-(4-chlorophenyl)-4-{[(2-chloro-3-pyridinyl)carbonyl]amino}-6-hydroxy-2,4-cyclohexadien-1-yl)sulfanyl]methyl}-2-oxoethyl)glutamine



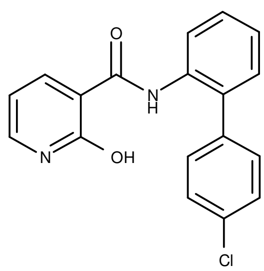
M510F47
2-chloronicotinic acid



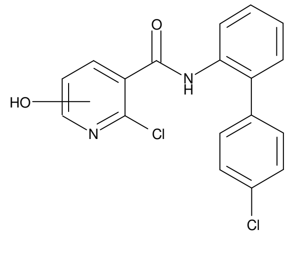
M510F48
3-{[(4'-chloro-biphenyl-2-yl)amino]carbonyl}-2-pyridinyl 1-thiohexopyranosiduronic acid



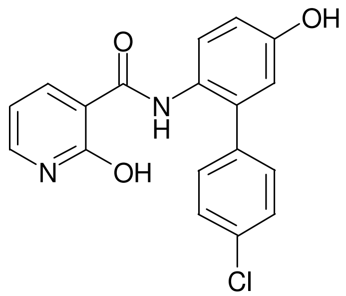
M510F49
N-(4’-chlorobiphenyl-2-yl)-2-hydroxynicotinamide



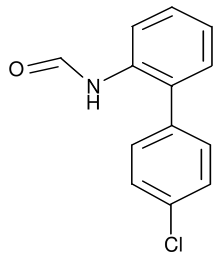
M510F50
2-chloro-*N*-(4'-chlorobiphenyl-2-yl)-?-hydroxynicotinamide



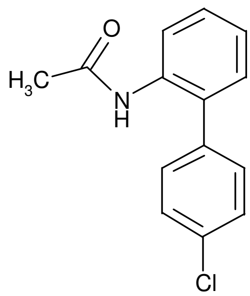
M510F51
N-(4'-chloro-5-hydroxybiphenyl-2-yl)-2-hydroxynicotinamide



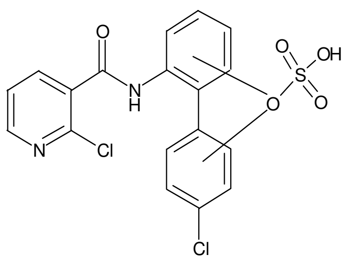
M510F52
4-chloro-2'-(formylamino)-biphenyl



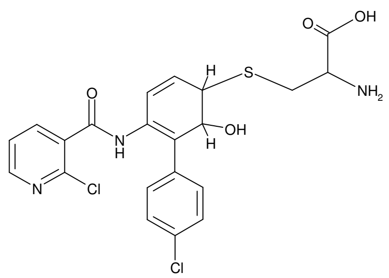
M510F53
4-chloro-2'-(acetylamino)-biphenyl



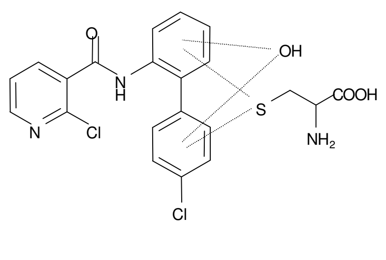
M510F54
2-chloro-N-(4’-chloro-?-sulfooxybiphenyl-2-yl)nicotinamide



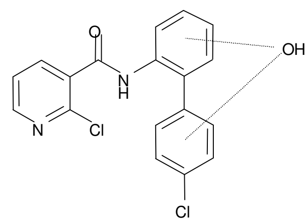
M510F57
or isomer
(5-(4-chlorophenyl)-4-{[(2-chloro-3-pyridinyl)carbonyl]amino}-6-hydroxy-2,4-cyclohexadien-1-yl)cysteine



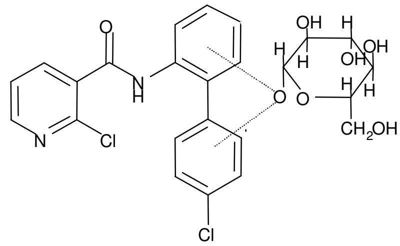
M510F58
(4-chloro-2'-{[(2-chloro-3-pyridinyl)carbonyl]amino}-?-hydroxybiphenyl-?-yl)cysteine



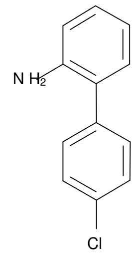
M510F59
2-chloro-N-(4'-chloro-?-hydroxybiphenyl-2-yl)nicotinamide



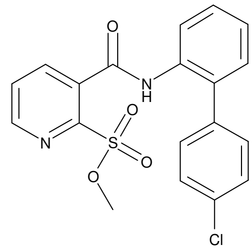
M510F61
4'-chloro-6-{[(2-chloro-3-pyridinyl)carbonyl]amino}biphenyl-?-yl glycopyranosiduronic acid



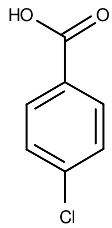
M510F62
4´-chlorobiphenyl-2-amine



M510F63
methyl 3-{[(4'-chloro[1,1'-biphenyl]-2-yl)amino]carbonyl}-2- pyridine sulfonate



M510F64
4-chlorobenzoic acid



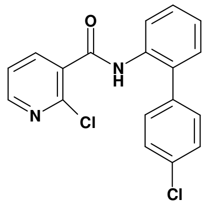
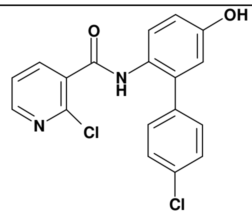
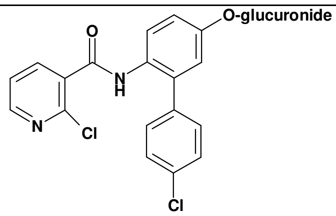
Animal metabolism

The Meeting received animal metabolism studies with boscalid in lactating goats and laying hens. Two lactating goats (Bunte deutsche Edelziege) weighing 44.5 and 37.5 kg on the initial day were dosed orally once daily for 5 consecutive days, by gavage, with a syringe at about 65 mg/animal/day of [diphenyl-U-^{14}C] labelled boscalid, equivalent to 35 ppm in the feed (Leibold and Hoffmann, 2000, 2000/1012353; Fabian and Grosshans, 2000/1017221, 2001; based on a consumption of 1.9 kg/day feed). Milk was collected twice daily; a day's sample began in the afternoon after dosing and ended with the morning milking preceding the next dose. The animals were slaughtered 23 hours after the final dose for tissue collection. Recovery of administered ^{14}C was 95% in Animal 1 and 98% in Animal 2.

The majority of the administered ^{14}C was rapidly and almost completely excreted in the faeces (46% and 64%) and urine (24% and 44%). Radioactivity recovered from urine and faeces together with cage wash amounted to 94–95% of the total radioactivity recovered. Milk accounted for 0.06% and 0.15% of the administered ^{14}C while tissues accounted for 0.46% and 0.66%. The distribution of the radiolabel and identified metabolites in milk and tissues are summarised in Table 1.

Parent compound and its hydroxylated metabolite M510F01, including the conjugate M510F02, were the main residues in milk and each of the tissues.

Table 1. Distribution of ^{14}C residue and identified metabolites in milk and tissues of lactating goats dosed orally for 5 days with 65 mg/animal/day of [diphenyl-U-^{14}C] labelled boscalid, equivalent to 35 ppm in the feed (Leibold and Hoffmann, 2000, 2000/1012353; Fabian and Grosshans, 2001, 2000/1017221).

Metabolite code (Reg.-No. of reference substance)	Structure	Milk (pool)	Muscle	Fat	Kidney	Liver
		mg/kg % TRR	mg/kg % TRR	mg/kg % TRR	mg/kg % TRR	mg/kg % TRR
Total ^{14}C residue		0.037	0.012	0.036	0.270	2.593
Extracted residue		0.037 99.3	0.010 79.7	0.024 62.8	0.219 81.3	0.430 16.6
Boscalid		0.001 3.2	0.002 20.4	0.012 34.6	0.007 2.5	0.129 5.0
M510F01		0.006 14.9	0.003 20.6	0.009 26.3	0.023 8.6	0.074 2.9
M510F02		0.002 6.4	0.001 11.9	n.d.	0.136 50.3	n.d.

n.d.: not detected

Four analytes could be detected after microwave-treatment of liver samples using acetonitrile and acetic acid. M510F01, M510F49 and M510F51 originated from extractable residues. Bound residues of boscalid were cleaved under microwave treatment at the amide bond to form M510F53. The major residues in liver were bound residues (Table 2). M510F53 could also be detected as a minor residue in milk and is due to minor sulfur substituted metabolites.

Table 2. Characterisation of the residual radioactive in liver and minor metabolites in milk as M510F53 by microwave treatment with acetonitrile and acetic acid (Fabian and Grosshans, 2001, 2000/1017221).

Sample	M510F53 [mg / kg] (% TRR)
Liver	1.130 (43.6)
Milk	0.004 (11.2)

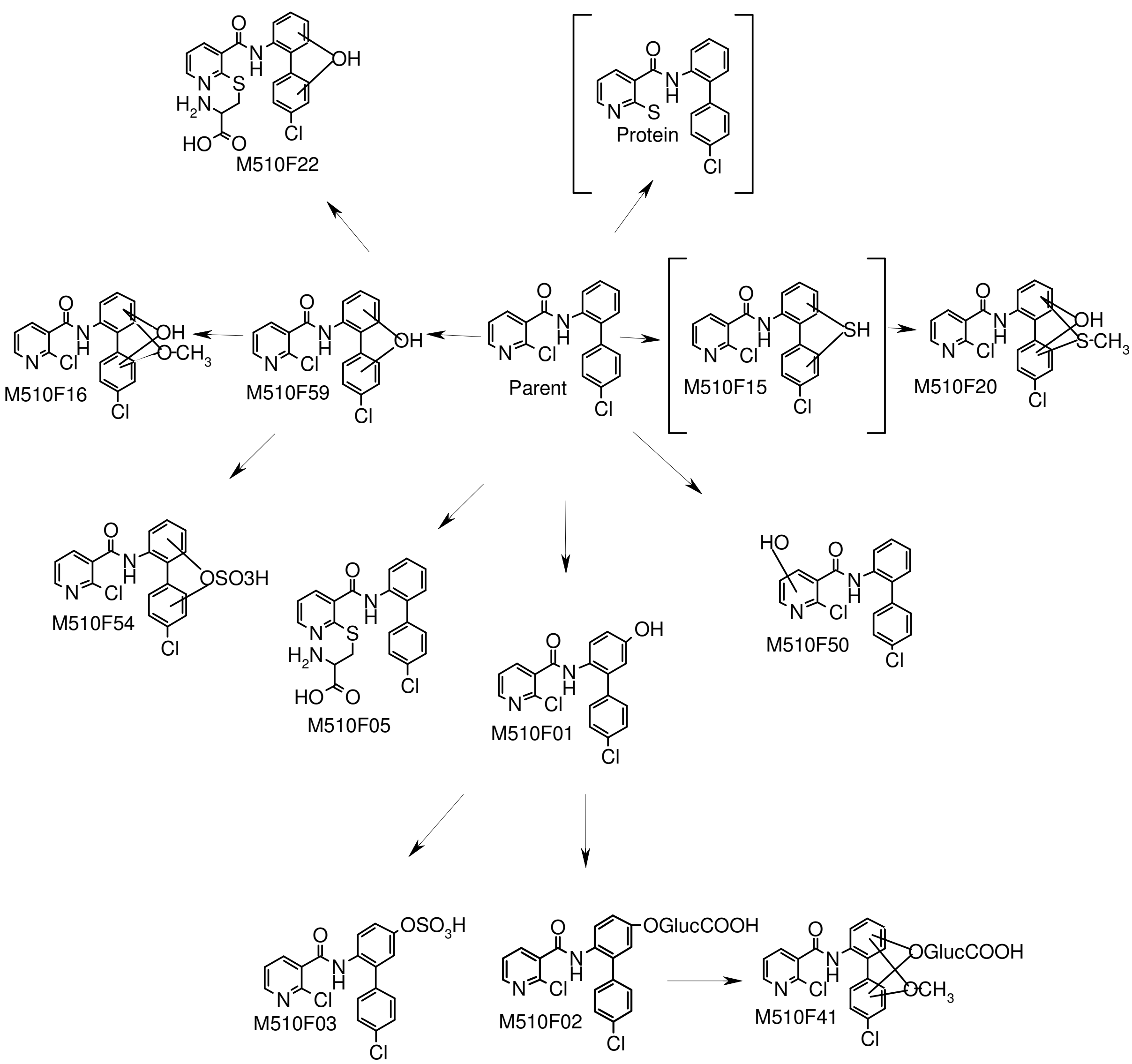


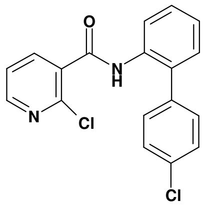
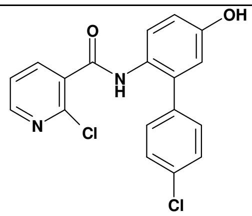
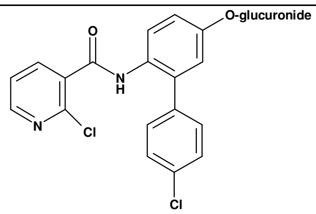
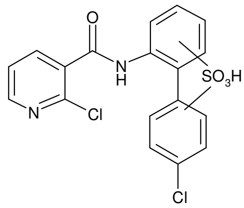
Figure 1. Proposed metabolic pathway for boscalid in lactating goats (Fabian and Grosshans, 2001, 2000/1017221).

Ten laying hens (body weight between 1.407 and 1.995 kg at study initiation) were administered encapsulated [diphenyl-U-^{14}C] labelled boscalid via a balling gun once daily for 10 consecutive days with 1.6 mg/bird/day, equivalent to 12.5 ppm in the feed (Nietschmann and Lam, 2000, 2000/5154; based on a consumption of 133 g/day feed). Individual eggs were collected twice daily and pooled by group starting on Study Day 0. The birds were slaughtered for tissue collection 21−23 hours after the final dose. Recovery of administered ^{14}C was 98.3%.

The majority of the administered ^{14}C was present in the excreta (97.7%). Eggs accounted for 0.115% of the administered ^{14}C while tissues, liver, fat and muscle accounted for 0.046%. The distribution of the radiolabel and identified metabolites in eggs and tissues are summarised in Table 3.

The parent compound, boscalid and its hydroxylated metabolite M510F01, including the conjugates M510F02 and M510F54, were the main residues in eggs. Muscle had a very low residue level (0.0025 mg/kg) and therefore was not further investigated. The main residue in fat was identified as the parent compound.

Table 3. Distribution of ^{14}C residue and identified metabolites in egg and tissues of laying hens administered encapsulated [diphenyl-U-^{14}C] labelled boscalid via a balling gun once daily for 10 consecutive days with 1.6 mg/bird/day, equivalent to 12.5 ppm in the feed (Nietschmann and Lam, 2000, 2000/5154).

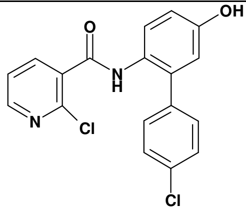
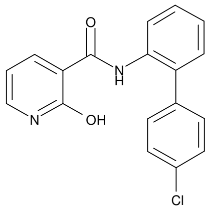
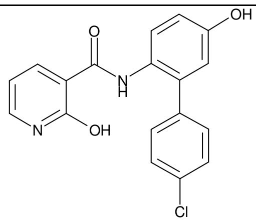
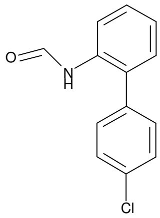
Metabolite code	Structure	Eggs (pool, day 2 - 10)	Fat	Liver[1)]
		mg/kg % TRR	mg/kg % TRR	mg/kg % TRR
Total ^{14}C residue		0.058	0.025	0.169
Extracted residue		0.053 92	0.023 93	0.020 12
Boscalid		0.020 35	0.023 93	n.d.
M510F01		0.015 27	n.d.	n.d.
M510F02		0.011 17	n.d.	n.d.
M510F54		0.0013 1.9	n.d.	n.d.

n.d.: not detected

1) It was not possible to identify any metabolites in the liver acetonitrile extract.

For further characterisation of the residues of boscalid in liver, a specially developed microwave method was applied. Four metabolites were be detected following microwave treatment of liver samples using acetonitrile and formic acid. It was demonstrated, in detailed experiments, that the detected analytes M510F01, M510F49 and M510F51 originated from extractable residues. Bound residues of boscalid are cleaved under microwave treatment at the amide bond to form M510F52. The major residues in liver were bound residues that correspond to M510F52 (Table 4).

Table 4. Summary of metabolite identities and quantities in hen liver hydrolysate after microwave treatment with acetonitrile and formic acid (Nietschmann and Lam, 2000, 2000/5154).

Metabolite code	Structure	Liver Hydrolysate mg/kg % TRR
M510F01		0.0094 5.55
M510F49		0.0214 12.71
M510F51		0.0366 21.69
M510F52		0.0710 42.09

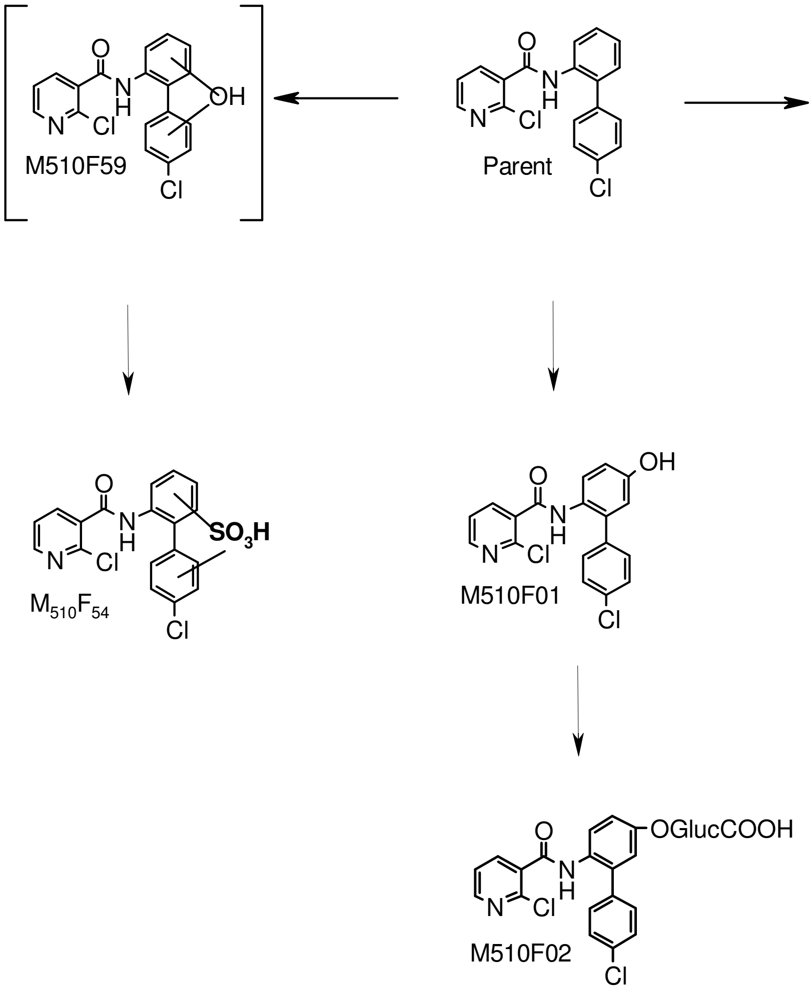


Figure 2. Proposed metabolic pathway for boscalid in laying hens (Nietschmann and Lam, 2000, 2000/5154).

No metabolism study was performed in pigs as the metabolic profile identified in rodents (rats) and ruminants (goats) did not differ significantly.

Plant metabolism

The Meeting received plant metabolism studies for boscalid on grapes, lettuce and beans. In each crop tested, parent compound generally represented more than 90% of the total ^{14}C residue and was essentially the only compound detected. The high extractability and the low non-extractable residues in various plant matrices demonstrate that boscalid showed almost no conversion to bound residues and therefore little or no presence of the corresponding carbohydrates, proteins or other natural products.

A grapevine (variety: Müller-Thurgau) metabolism study with ^{14}C-boscalid (diphenyl- and pyridine-label) was performed with three spray applications, each with 800 g ai/ha, corresponding to the expected maximum recommended use rate (Rabe and Schlüter, 2001, 2000/1014860). The first application was carried out at the end of flowering, the second application 13 days later and the third 41 days after the second. Samples were taken at the maturity of grapes (45 days after the last treatment).

For all sample materials, the solvent extractability was very high. An HPLC analysis of the methanol and the water extracts of all matrices showed that most of the radioactive residues were unchanged parent (Table 5). Boscalid showed almost no metabolism to bound residues and thus no conversion to carbohydrates, proteins or other natural products.

Table 5. Summary of identified boscalid in grape samples after treatment with ^{14}C-boscalid (diphenyl- and pyridine- label) (Rabe and Schlüter, 2001, 2000/1014860).

Matrices	Total radioactive residues [mg/kg] Diphenyl label (%TRR)	Total radioactive residues [mg/kg] Pyridine label (%TRR)
Grapes (at harvest)	1.09 (92.7%)	1.90 (92.2%)
Stalks (at harvest)	11.9 (96.4%)	19.1 (97.5%)
Leaves (at harvest)	41.7 (95.6%)	60.8 (96.1%)

A lettuce (variety: Nadine) metabolism study with ^{14}C-boscalid (diphenyl- and pyridine-label) was performed with three spray applications, each with 700 g ai/ha, corresponding to the expected maximum recommended use rate in a greenhouse situation (Hamm, 1999, 1999/11240). The first application was performed 8 days after planting, the second and third applications 14 days later, respectively. The third treatment was done 18 days before harvest (PHI). Only one sampling was done 18 days after the third application.

The solvent extractability was high (about 99%) in all matrices. The two calculated TRRs of leaves treated with the two labels corresponded to 17.5 mg/kg (diphenyl label) and 17.6 mg/kg (pyridine label). The extractable radioactivity (ERR) was identified by HPLC and LC/MS/MS as unchanged parent only. Boscalid showed almost no conversion to bound residues such as carbohydrates, proteins or other natural products.

Table 6. Summary of identidied boscalid in lettuce samples after treatment with ^{14}C-boscalid (diphenyl- and pyridine- label) (Hamm, 1999, 1999/11240).

Matrices	Total radioactive residues [mg/kg] Diphenyl label (%TRR)	Total radioactive residues [mg/kg] Pyridine label
Lettuce	17.4 (99.3%)	17.5 (99.3%)

A bean metabolism study with ^{14}C-boscalid (diphenyl- and pyridine-label) was performed with three spray applications, each with 500g ai/ha, corresponding to the expected maximum recommended use rate in a glass house or in growth chambers (Veit, 2001, 2000/1014861). The first application was carried out at the beginning of flowering, the second application 8–10 days later and the third application 8–10 days after the second. The tests with the different labels were not done in the same time period. The pyridine label was applied at the end of February and the plants were grown in a growth chamber. The diphenyl label was applied in the beginning of March of the following year and the plants were grown in a glass house. Bean plant samples were collected directly after the last treatment. At 14/15 days (diphenyl/ pyridine label, respectively) after the last treatment, bean forage and green beans were harvested. The green beans were separated into pods and seeds and analysed individually to cover other bean varieties. At 53/51 days (diphenyl/pyridine label) after the last treatment, bean straw, dry pods and dry seeds were harvested.

The TRR values for the diphenyl label were, in all cases, higher than for the pyridine label. In all sample materials; the solvent extractability was generally > 80%. The fact that the two parts of the study were conducted a year apart may account for the differences in the TRR values. The pattern and the ratio of the TRR values of the two labels were similar for the different matrices. In plant samples, parent compound generally represented more than 90% of the total ^{14}C residue.

Table 7. Summary of identidied boscalid in beans samples after treatment with ^{14}C-boscalid (diphenyl- and pyridine- label) (Veit, 2001, 2000/1014861).

Matrices (Days after last treatment DALT)	Total radioactive residues [mg/ kg] Diphenyl label (%TRR)	Total radioactive residues [mg/ kg] Pyridine label (%TRR)
Bean plant (0)	48.7 (99.3)	20.8 (98.1%)
Bean Forage (14/15)	65.2 (98.6%)	16.6 (98.4%)

Matrices (Days after last treatment DALT)	Total radioactive residues [mg/ kg] Diphenyl label (%TRR)	Total radioactive residues [mg/ kg] Pyridine label (%TRR)
Green Beans (14/15)	0.999 (97.2%)	0.071 (78.1)
Bean Pods (14/15)	0.872 (96.7%)	0.095 (87.0%)
Bean Seeds 14/15)	0.173 (87.5%)	0.043 (64.9%)
Bean Straw (53/51)	120.9 (95.1%)	87.7 (93.6%)
Bean Dry Pods (53/51)	5.78 (94.5%)	1.09 (79.7%)
Bean Dry Seeds (53/51)	0.148 (72%)	0.047 (36.9%)

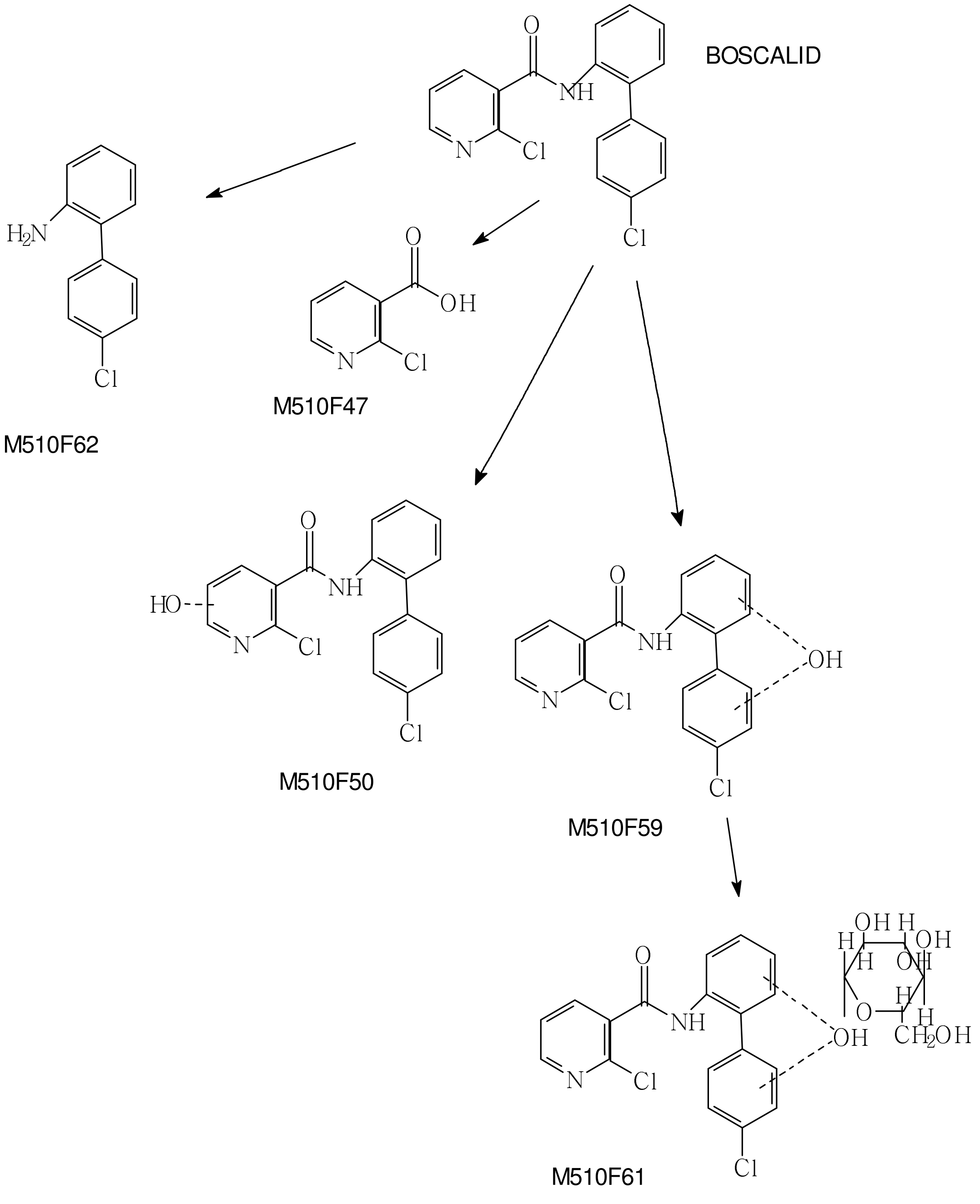


Figure 3. Proposed metabolic pathway for boscalid in beans.

Environmental fate in soil

The Meeting received information on the environmental fate of boscalid in soil, including studies on aerobic and anaerobic soil metabolism, field dissipation and crop rotational studies. Because boscalid is used on peanuts and potatoes (the edible portion of which is in the soil), additional studies on aerobic soil metabolism and field dissipation are needed as well.

A study on the aerobic soil metabolism of [^{14}C] boscalid in a sandy loam soil showed that boscalid degraded slowly and identifiable metabolites were a minor part of the residue which in turn degraded almost at the same rate (Stephan, 1999, 1999/11807). The pyridine-labelled test compound was mineralized to $^{14}CO_2$ more quickly than the diphenyl-label test compound. No volatiles other than $^{14}CO_2$ were found. The non-extractable ^{14}C in the soil treated with diphenyl labelled boscalid had begun to decline within 266 days and that in the soil treated with pyridine labelled boscalid increased continuously during the whole period of incubation.

Aerobic soil metabolism — Ref: Stephan, 1999, 1999/11807

Test material: [^{14}C]boscalid, diphenyl-labelled — Dose rate: 0.933 mg/kg dry soil
Sandy loam — pH: 7.4 — Organic carbon: 1.3%
Duration: 364 days — Temp: 20°C — Moisture: 40% maximum water holding capacity

Half-life of boscaild: 108 days
% boscalid remaining, day 364 = 16.7 % — % mineralization, day 364 = 15.5 %

Metabolites	Max (% of dose)	Day
M510F49	0.2 %	57
M510F50	0.1 %	266
Others	1.0 %	266
$^{14}CO_2$	15.5%	364
Non-extractable ^{14}C	62.7 %	266

Test material: [^{14}C]boscalid, pyridine-labelled — Dose rate: 1.022 mg/kg dry soil
Half-life of boscaild: 108 days
% boscalid remaining, day 364 = 17.3 % — % mineralization, day 364 = 25.4 %

Metabolites	Max (% of dose)	Day
M510F49	0.2 %	93
M510F50	0.1 %	93
Others	1.0 %	119
$^{14}CO_2$	25.4%	364
Non-extractable ^{14}C	50.1%	364

Another study on the aerobic soil metabolism of [diphenyl-U-^{14}C] boscalid in four different soils at different temperatures and soil moistures for 120 days showed again that boscalid degraded slowly and identifiable metabolites were a minor part of the residue which also mostly degraded relatively slowly (Ebert and Harder, 2000, 2000/1013279). The volatiles including $^{14}CO_2$ were not trapped in this study. The non-extractable ^{14}C in the soil treated with diphenyl labelled boscalid had begun to decline within 266 days.

Aerobic soil metabolism — Ref: Ebert and Harder, 2000, 2000/1013279

Test material: [^{14}C]boscalid, diphenyl-labelled — Dose rate: 1.0 mg/kg dry soil
Loamy sand — pH: 5.6 — Organic carbon: 2.5%
Duration: 120 days — Temp: 20°C — Moisture: 40% maximum water holding capacity

Half-life of boscalid: 384 days
% boscalid remaining, day 120 = 78.8% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	0.7%	60
Non-extractable ^{14}C	16.8%	120

Duration: 120 days	pH: 5.6 Temp: 5°C	Organic carbon: 1.9% Moisture: 40% maximum water holding capacity

Half-life of boscalid: stable
% boscalid remaining, day 119 = 103.8% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	0.8%	0
Non-extractable ^{14}C	1.9%	119

Duration: 120 days	pH: 5.7 Temp: 30°C	Organic carbon: 2.18% Moisture: 40% maximum water holding capacity

Half-life of boscalid: 365 days
% boscalid remaining, day 120 = 84.4% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	1.6%	120
Non-extractable ^{14}C	13.0%	120

Duration: 120 days	pH: 5.9 Temp: 20°C	Organic carbon: 2.0% Moisture: 20% maximum water holding capacity

Half-life of boscalid: stable
% boscalid remaining, day 120 = 98.8% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	0.9%	120
Non-extractable ^{14}C	7.6%	120

Duration: 120 days, sterile	Temp: 20°C	Moisture: 40% maximum water holding capacity

Half-life of boscalid: stable
% boscalid remaining, day 120 = 100.5% — % mineralization, day 120 = 0 %

Metabolites	Max (% of dose)	Day
Others	1.7%	3
Non-extractable ^{14}C	2.8%	120

Sandy loam Duration: 120 days	pH: 7.0 Temp: 20°C	Organic carbon: 0.6% Moisture: 40% maximum water holding capacity

Half-life of boscalid: 376 days
% boscalid remaining, day 120 = 80.9 % — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	0.5 %	120
Non-extractable ^{14}C	21.5 %	120

Loamy sand Duration: 120 days	pH: 6.6 Temp: 20°C	Organic carbon: 1.0% Moisture: 40% maximum water holding capacity

Half-life of boscalid: 322 days
% boscalid remaining, day 120 = 77.7% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	0.3%	91
Non-extractable ^{14}C	16.6%	120

Loam	pH: 7.7	Organic matter: 5.2%
Duration: 119 days	Temp: 20°C	Moisture: 40% maximum water holding capacity

Half-life of boscalid: 133 days

% boscalid remaining, day 119 = 53.6% — % mineralization, not measured

Metabolites	Max (% of dose)	Day
Others	1.3%	7
Non-extractable ^{14}C	50.1%	119

Two studies on the anaerobic soil metabolism of [^{14}C] boscalid in two soil types showed that boscalid degraded very slowly and identifiable metabolites were a minor part of the residue, except for M510F47 where a maximum of 6.7% formed in the study using pyridine-labelled boscalid (Staudenmaier and Schäfer, 2000, 2000/1014986; Staudenmaier, 2000, 2000/1014990). The non-extractable ^{14}C in the soil treated with diphenyl labelled and pyridine labelled boscalid increased continuously during the whole period of the incubation.

Anaerobic soil metabolism

Ref: Staudenmaier and Schäfer, 2000, 2000/1014986; Staudenmaier 2000/1014990

Test material: [^{14}C]boscalid, diphenyl-labelled		Dose rate: 1.0 mg/kg dry soil
Sandy loam	pH: 7.2	Organic carbon: 1.6%
Duration: 120 days	Temp: 20°C	Moisture: 40% maximum water holding capacity

Half-life of boscalid: 261 days

% boscalid remaining, day 120 = 73.6% — % mineralization, day 120 = 0.1 %

Metabolites	Max (% of dose)	Day
Others	0.6%	90
Non-extractable ^{14}C	15.8%	120

Test material: [^{14}C]boscalid, pyridine-labelled		Dose rate: 1.0 mg/kg dry soil
Sandy loam	pH: 7.5	Organic carbon: 1.7%
Duration: 120 days	Temp: 20°C	Moisture: 40% maximum water holding capacity

Half-life of boscalid: 345 days

% boscalid remaining, day 120 = 77.0% — % mineralization, day 120 = 0.4 %

Metabolites	Max (% of dose)	Day
M510F47	6.7%	120
Others	0.8 %	0
$^{14}CO_2$	0.4%	120
Non-extractable ^{14}C	14.4%	120

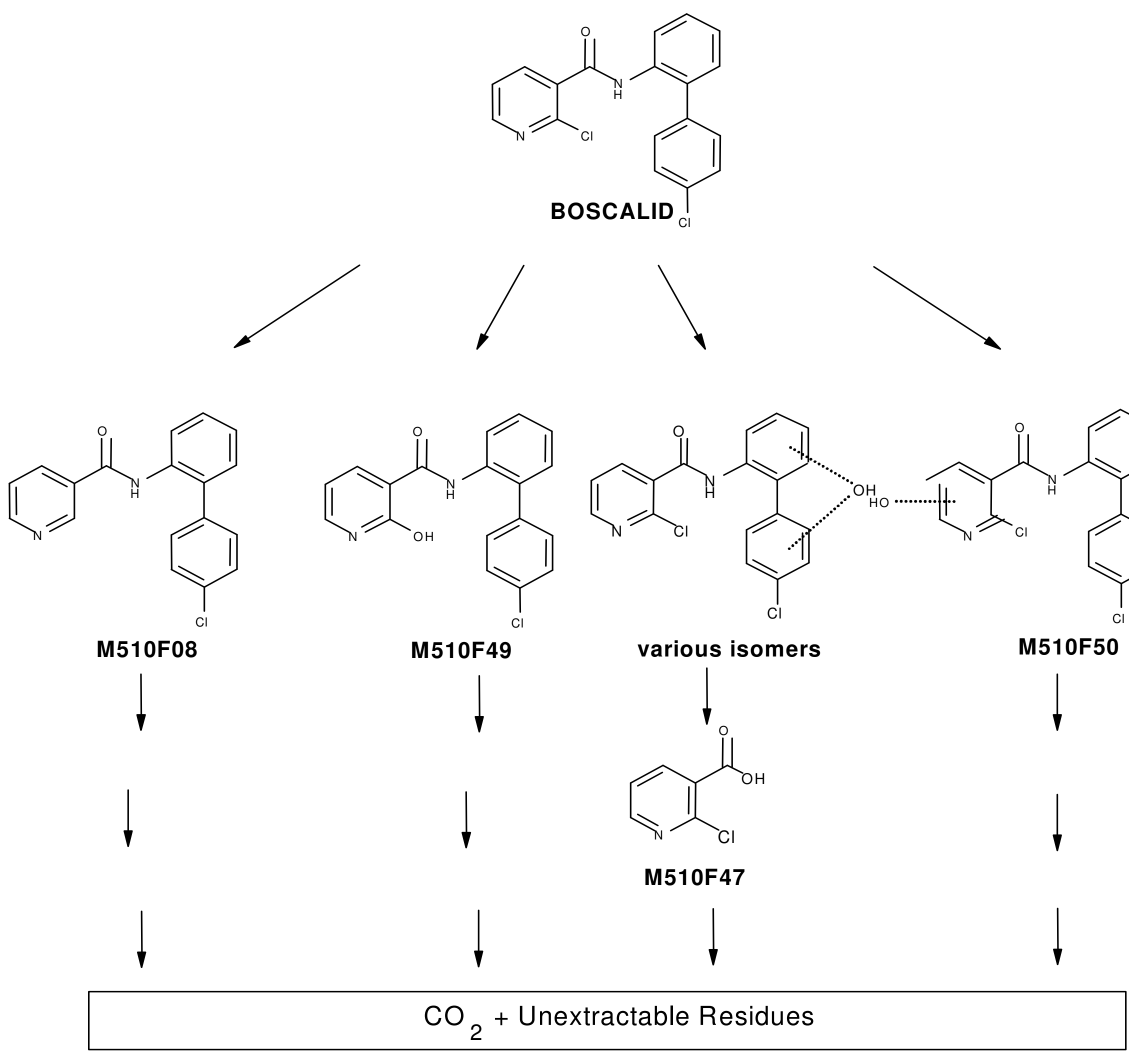


Figure 4. Proposed metabolic pathway for boscalid in soil.

The degradation behaviour (field dissipation) of boscalid in two different soils was investigated by Kellner and Keller (2000, 2000/1000123) under field conditions at two locations in Germany with three different application rates each on bare soil in 1997. Soil samples were taken at 9 sampling times up to 545 days and down to a maximum soil depth of 50 cm from the plots. The DT_{50} values were shorter with higher application rates, and the DT_{90} was not reached within one year, after application to bare soil. The highest amounts of boscalid were found in the top layer (0-10 cm) of soil (Table 8). Minor amounts were found in the 10 to 25 cm layer.

Table 8. Field dissipation of boscalid in 2 different soils in Germany in 1997 (Kellner and Keller, 2000, 2000/1000123).

Trial	Applic rate, kg/ha	Initial conc, mg/kg	Boscalid as % of original concentration in 0-10 cm soil.					
			30 days	93 days	176 days	365 days	449days	544 days
Germany (Baden Württemberg) 1997 treat in April	Plot area 8.4 sq m. Silty loam: pH 7.5, 11.5% sand, 69.7% silt, 18.8% clay, 0.83% organic carbon.							
	0.3	0.23	87%	51%	26%	33%	14%	9.7%
	0.6	0.63	63%	21%	15%	21%	12%	8.9%
	1.2	1.35	45%	25%	23%	17%	12%	6.7%

Trial	Applic rate, kg/ha	Initial conc, mg/kg	Boscalid as % of original concentration in 0-10 cm soil.					
			28 days	97 days	179 days	367 days	452 days	545 days
Germany (Rheinland Pfalz) 1997 treat in April	Plot area 8.6 sq m. Silty sand: pH 5.4, 76.5% sand, 19.1% silt, 4.4% clay, 0.69% organic carbon.							
	0.3	0.20	74%	56%	48%	42%	33%	27%
	0.6	0.41	78%	62%	43%	53%	35%	26%
	1.2	0.91	94%	49%	41%	47%	33%	27%

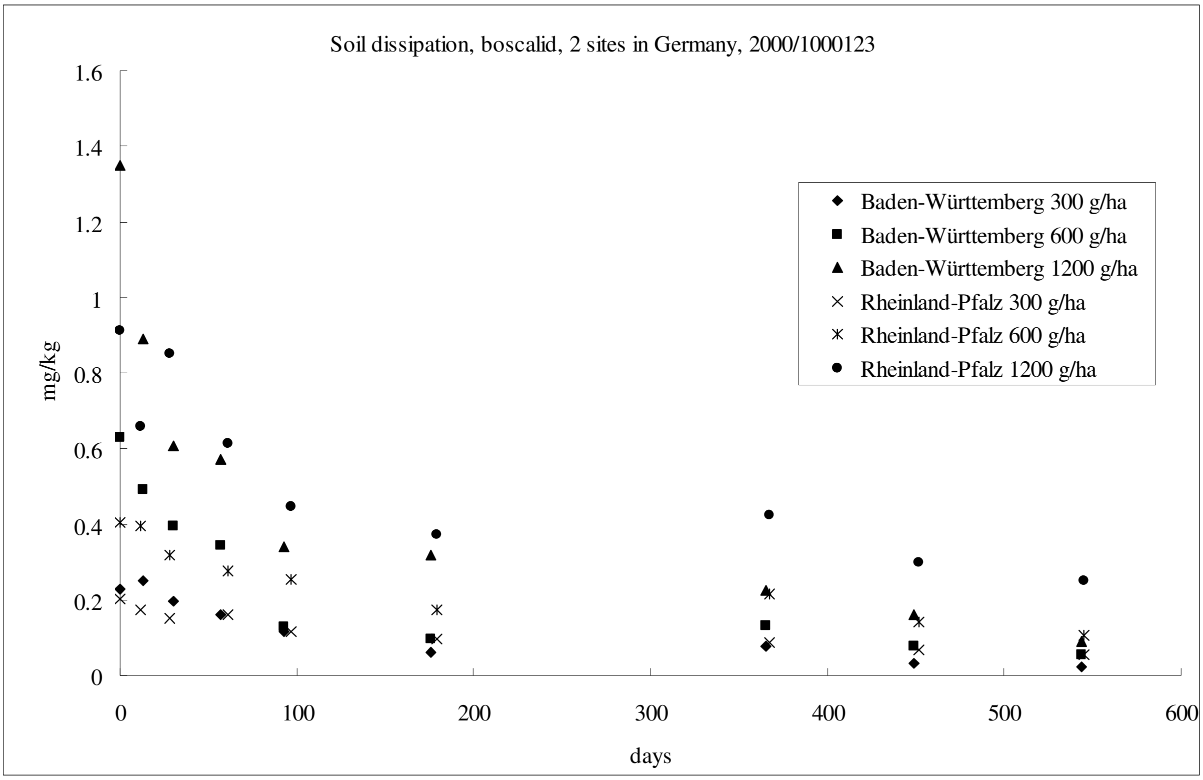


Figure 5. Disappearance of boscalid in soil at 2 sites in Germany at three different rates each on bare soil (Kellner and Keller, 2000, 2000/1000123).

The degradation behaviour of boscalid was also investigated, under field conditions on bare soil, at four locations in Europe in 1998 (Bayer and Grote 2001, 2000/1013295). Soil samples were taken on either 7 or 8 occasions, for up to 1 year and down to a maximum soil depth of 50 cm. The DT_{50} values determined were shorter in Southern Europe than in Northern Europe, while the DT_{90} was not reached one year after application to bare soil (see Table 9). The highest amounts of boscalid were found in the top layer (0-10cm) of the soils. Minor amounts were found in the 10 to 25 cm layer. No residues, above the limit of quantification, were found in the 25−50cm layer...

Table 9. Field dissipation of boscalid at four locations in Europe in 1998 (Bayer and Grote, 2001, 2000/1013295).

Trial	Applic rate, kg/ha	Initial conc, mg/kg	Boscalid as % of original concentration in 0-10 cm soil.				
			30 days	60 days	98 days	182 days	349 days
Spain (Andalucid /Huelva) 1998	Plot area 6.25 sq m. Sandy loam: pH 7.4, 58% sand, 23% silt, 19% clay, 0.6% organic carbon.						
treat in May	0.74	0.29	55%	49%	54%	52%	49%

Trial	Applic rate, kg/ha	Initial conc, mg/kg	Boscalid as % of original concentration in 0-10 cm soil.				
			30 days	63 days	99 days	182 days	356 days
Spain (Andalucid /Sevilla) 1998	Plot area 6.25 sq m. Sandy loam: pH 7.7, 43% sand, 35% silt, 22% clay, 0.9% organic carbon.						
treat in May	0.76	0.30	97%	102%	56%	39%	55%
Sweden (Skane)			31 days	60 days	101 days	182 days	352 days
1998	Plot area 9 sq m. Loamy sand: pH 5.9, 76% sand, 13% silt, 11% clay, 1.0% organic carbon.						
treat in May	0.80	0.32	107%	138%	178%	114%	115%
Germany			30 days	59 days	97 days	181 days	357 days
(Schleswig-Holstein) 1998	Plot area 18 sq m. Loamy sand: pH 8, 57% sand, 30% silt, 13% clay, 1.1% organic carbon.						
treat in May	0.78	0.52	71%	70%	59%	31%	42%

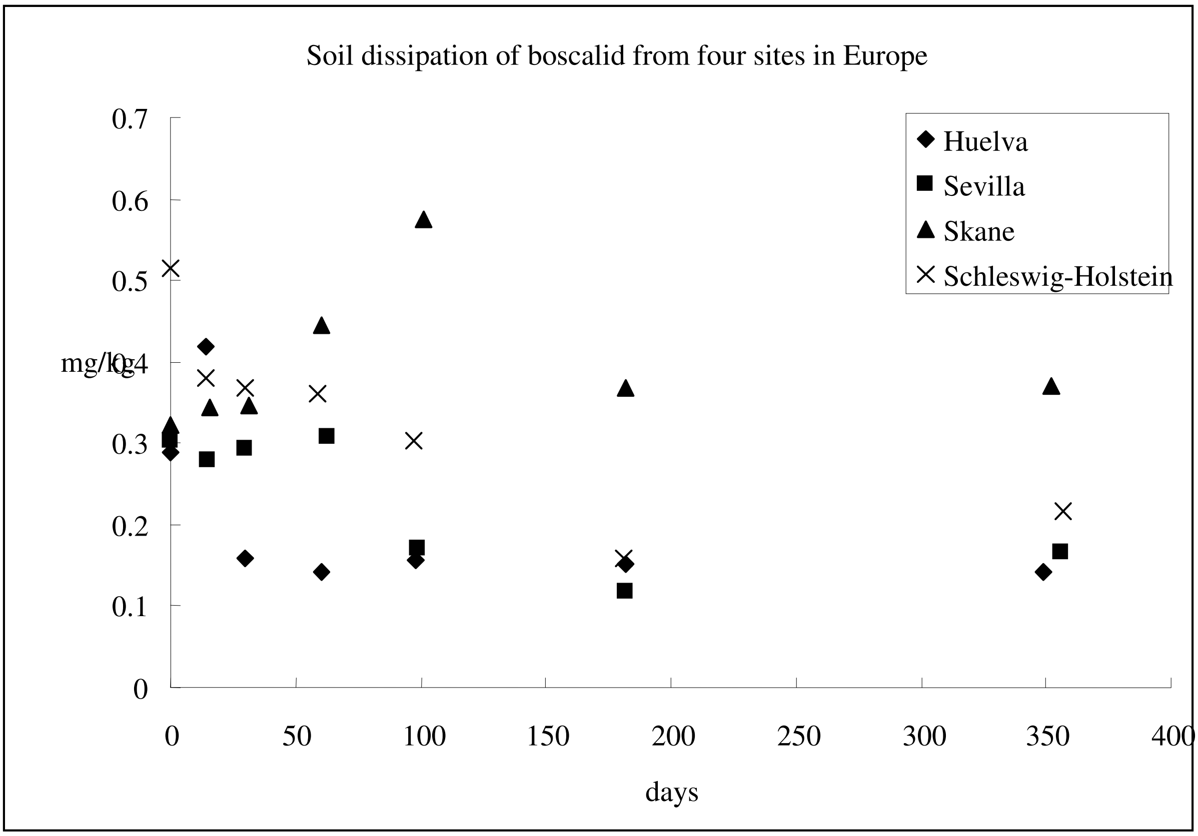


Figure 6. Disappearance of boscalid from soil at four sites in Europe after application to bare soil (Bayer and Grote, 2001, 2000/1013295).

Rotational crop studies

Information on the fate of radiolabelled boscalid in a confined crop rotational study was made available to the Meeting.

A confined rotational crop study in Germany (Hamm and Veit, 2001, 2000/1014862) was conducted with ^{14}C-boscalid (diphenyl- and pyridine-label) with a single application of 2.1 kg ai/ha to bare soil (loamy sand, 0.9% organic matter, pH 6.7). Crops of lettuce, radish and wheat were sown into the treated soil at intervals of 30, 120, 270 and 365 days after the application. The crops were grown to maturity, harvested and analysed for ^{14}C content (Table 11). Samples were further examined by extraction and HPLC analysis. In all samples, unchanged ^{14}C-boscalid was detected in various concentrations with the tendency for lower levels over the course of the study and with longer plant back intervals. One metabolite, M510F61, a glucoside of the hydroxylated parent compound, was found in various matrices, but not in lettuce, radish roots or wheat grains. The concentration was generally low, except in wheat straw.

Table 10. Total radioactive residues in soil samples after treatment with ^{14}C-boscalid (pyridine and diphenyl label) (Hamm and Veit, 2001, 2000/1014862).

Soil Samples	Boscalid Pyridine label TRR [mg/kg]	Boscalid Diphenyl label TRR [mg/kg]
After application		
Plant back intervals (after soil aging and ploughing)		
30 DAT	0.716	1.112
120 DAT	0.648	0.813
270 DAT	0.647	n.d.
365 DAT	0.356	0.429
After harvest of mature crops		
Plant back interval: 30 DAT		
Radish	n.d.	0.731
Lettuce	0.545	0.747
Wheat	0.379	0.393
Plant back interval: 120 DAT		
Radish	0.548	0.585
Lettuce	0.484	0.409
Wheat	0.386	0.506
Plant back interval: 270 DAT		
Radish	0.377	0.521
Lettuce	0.321	0.436
Wheat	0.537	0.551
Plant back interval: 365 DAT		
Radish	n.d.	0.460
Lettuce	n.d.	0.434
Wheat	0.125	0.343

n.d.: not determined.

Table 11. Investigation of the nature of the residues in rotational crops after treatment with ^{14}C-boscalid (Hamm and Veit, 2001, 2000/1014862).

Crop parts	TRR mg/kg	Extractable radioactive residue mg/kg (% TRR)	Unextractable radioactive residue mg/kg (% TRR)	Boscalid mg/kg (% TRR)	M510F61 mg/kg (% TRR)
Pyridine Label					
Plant back interval: 30 DAT					
lettuce leaf	0.035	0.029 (83.1)	0.007 (18.8)	0.020 (58.5)	-
radish leaf	0.343	0.317 (92.2)	0.027 (7.8)	0.301 (87.6)	0.016 (4.6)
radish root	0.048	0.040 (81.9)	0.009 (19.3)	0.030 (62.7)	-
wheat forage	0.690	0.654 (94.7)	0.047 (6.8)	0.619 (89.8)	0.024 (3.4)
wheat straw	3.609	3.347 (92.8)	0.351 (9.7)	3.156 (87.5)	0.102 (2.8)

Crop parts	TRR mg/kg	Extractable radioactive residue mg/kg (% TRR)	Unextractable radioactive residue mg/kg (% TRR)	Boscalid mg/kg (% TRR)	M510F61 mg/kg (% TRR)
wheat grain	0.147	0.036 (24.7)	0.130 (88.3)	0.009 (6.1)	-
Plant back interval: 120 DAT					
lettuce leaf	0.161	0.146 (90.8)	0.015 (9.2)	0.146 (90.8)	-
radish leaf	0.211	0.187 (88.8)	0.024 (11.2)	0.172 (81.8)	0.015 (7.0)
radish root	0.038	0.031 (81.6)	0.007 (18.4)	0.023 (60.1)	0.008 (21.5)
wheat forage	0.433	0.384 (88.6)	0.054 (12.5)	0.379 (87.5)	-
wheat straw	4.008	2.882 (71.9)	1.293 (32.3)	2.598 (64.8)	0.117 (2.9)
wheat grain	0.285	0.074 (26.2)	0.260 (91.1)	0.015 (5.3)	-
Plant back interval: 270 DAT					
lettuce leaf	0.031	0.023 (74.5)	0.008 (25.5)	0.020 (65.1)	-
radish leaf	0.125	0.108 (86.1)	0.017 (13.9)	0.104 (82.5)	0.004 (3.6)
radish root	0.017	0.013 (77.1)	0.004 (22.9)	0.009 (52.6)	-
wheat forage	0.230	0.224 (97.3)	0.006 (2.7)	0.214 (92.8)	0.005 (2.3)
wheat straw	1.614	0.998 (61.8)	0.703 (43.6)	0.808 (50.0)	0.071 (4.4)
wheat grain	0.271	0.049 (17.9)	0.260 (96.0)	0.005 (1.9)	-
Plant back interval: 365 DAT					
lettuce leaf	0.022	0.017 (76.1)	0.005 (23.9)	0.014 (61.6)	-
radish leaf	0.113	0.103 (91.1)	0.010 (8.9)	0.088 (78.2)	0.013 (11.2)
radish root	0.066	0.060 (91.0)	0.006 (9.0)	0.060 (91.0)	-
wheat forage	0.255	0.213 (83.5)	0.042 (16.5)	0.191 (74.7)	0.008 (2.9)
wheat straw	1.925	1.582 (82.1)	0.437 (22.7)	1.488 (77.3)	-
wheat grain	0.148	0.029 (19.7)	0.138 (93.2)	0.006 (4.2)	-
Diphenyl Label					
Plant back interval: 30 DAT					
lettuce leaf	0.050	0.047 (93.8)	0.003 (6.2)	0.047 (93.8)	-
radish leaf	0.337	0.324 (96.1)	0.013 (3.9)	0.304 (90.2)	0.020 (5.9)
radish root	0.072	0.067 (93.1)	0.005 (6.9)	0.064 (89.6)	-

Crop parts	TRR mg/kg	Extractable radioactive residue mg/kg (% TRR)	Unextractable radioactive residue mg/kg (% TRR)	Boscalid mg/kg (% TRR)	M510F61 mg/kg (% TRR)
wheat forage	1.575	1.531 (97.2)	0.071 (4.5)	1.472 (93.5)	0.032 (2.0)
wheat straw	9.826	9.214 (93.8)	1.412 (14.4)	7.991 (81.3)	0.423 (4.3)
wheat grain	0.166	0.059 (35.3)	0.135 (81.6)	0.028 (16.8)	-
Plant back interval: 120 DAT					
lettuce leaf	0.084	0.075 (89.2)	0.009 (10.8)	0.072 (85.2)	-
radish leaf	0.294	0.256 (87.2)	0.046 (15.6)	0.209 (71.2)	-
radish root	0.052	0.043 (82.1)	0.011 (21.3)	0.035 (67.8)	0.006 (10.9)
wheat forage	0.980	0.909 (92.8)	0.113 (11.5)	0.846 (86.4)	0.021 (2.1)
wheat straw	3.912	3.704 (94.7)	0.414 (10.6)	3.311 (84.6)	0.187 (4.8)
wheat grain	0.243	0.062 (25.3)	0.213 (87.8)	0.023 (9.6)	-
Plant back interval: 270 DAT					
lettuce leaf	0.067	0.063 (94.1)	0.004 (5.9)	0.063 (94.1)	-
radish leaf	0.150	0.141 (94.3)	0.009 (5.7)	0.109 (73.1)	0.032 (21.2)
radish root	0.098	0.091 (92.8)	0.007 (7.2)	0.091 (92.8)	-
wheat forage	0.562	0.512 (91.2)	0.066 (11.7)	0.352 (62.8)	0.102 (18.1)
wheat straw	3.226	2.865 (88.8)	0.739 (22.9)	2.283 (70.8)	0.030 (0.9)
wheat grain	0.023	0.013 (58.3)	0.015 (64.6)	0.008 (35.4)	-
Plant back interval: 365 DAT					
lettuce leaf	0.028	0.022 (76.3)	0.010 (37.2)	0.016 (55.6)	-
radish leaf	0.207	0.197 (95.2)	0.018 (4.8)	0.144 (69.4)	0.032 (15.5)
radish root	0.030	0.027 (89.9)	0.003 (10.1)	0.024 (78.4)	0.001 (4.0)
wheat forage	0.265	0.255 (96.1)	0.018 (6.9)	0.199 (75.0)	0.026 (9.8)
wheat straw	1.404	1.335 (95.1)	0.151 (10.7)	1.088 (77.6)	0.025 (1.8)
wheat grain	0.048	0.019 (40.3)	0.036 (74.9)	0.011 (23.6)	-

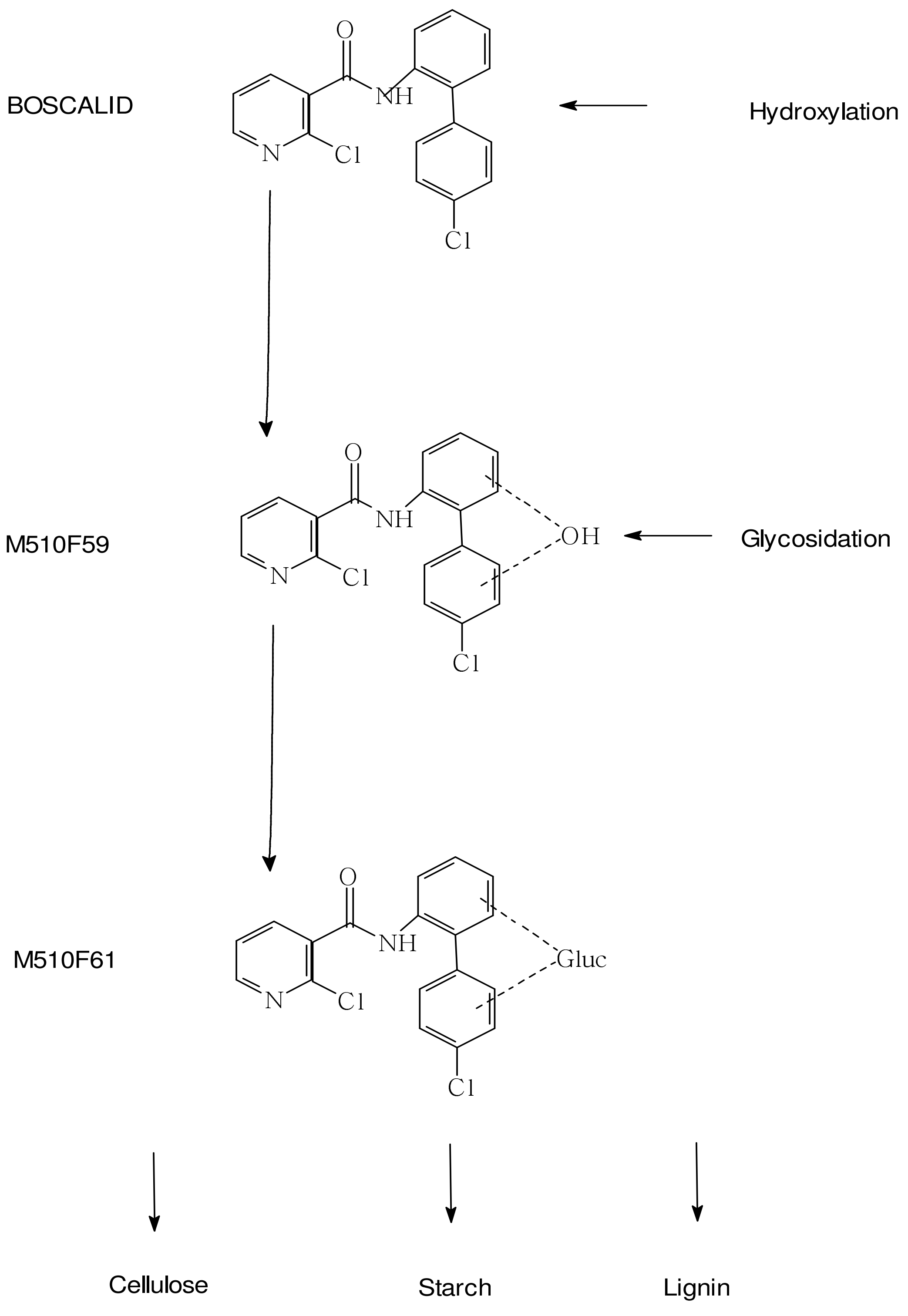


Figure 7. Proposed metabolic pathway for boscalid in succeeding crops (Hamm and Veit, 2001, 2000/1014862).

RESIDUE ANALYSIS

Analytical methods

The Meeting received descriptions and validation data for analytical methods for residues of boscalid in raw agricultural commodities, processed commodities, feed commodities, animal tissues, milk and eggs.

The methods rely on HPLC-UV, HPLC-MS/MS and GC-MSD for analysis of boscalid in the various matrices. Boscalid and its metabolites were determined and reported.

Determination of boscalid in plant matrices (Funk and Mackenroth, 2001, 2000/1012404)

Analyte:	Boscalid	HPLC-MS/MS	Method 445/0
LOQ:	0.05 mg/kg in all matrices		
Description	After extraction of the plant material with a methanol/water/hydrochloric acid mixture and subsequent centrifugation of an aliquot, transfer an aliquot of the supernatant into a culture tube containing water. For purification, perform liquid/liquid partitioning with cyclohexane. Evaporate the cyclohexane to dryness and dissolve the residue in methanol/water for HPLC-MS/MS quantification. For boscalid, the transition ions m/z = 343 -> 271 and m/z = 343 -> 307 can be used for quantification.		

Cereal grains (Funk, 2002, 2002/1004107)

Analyte:	Boscalid	HPLC-MS/MS	Method 514/0
LOQ:	0.01 mg/kg		
Description	Boscalid is extracted with a mixture of methanol, water and hydrochloric acid. An aliquot of the extract is centrifuged and partitioned against cyclohexane. The final determination of boscalid is performed by HPLC-MS/MS		

Various plant materials (Weeren and Pelz, 1999, 1999/11461)

Analyte:	Boscalid	GC-MSD	DFG method S19
LOQ:	Typically 0.01 mg/kg. Oilseed rape 0.02 mg/kg.		
Description	The sample material is extracted with acetone/water 2+1 (v/v). In case of lemons, the pH value has to be adjusted to 7-8 by means of $NaHCO_3$. For liquid/liquid partition, ethyl acetate/cyclohexane (1+1) and sodium chloride is added and after repeated mixing, excess water is separated. The evaporated residue of an aliquot of the organic phase is cleaned up by gel permeation chromatography on Bio Beads S-X3 polystyrene gel using a mixture of ethyl acetate/cyclohexane (1+1) as eluant and an automated gel permeation chromatograph. The residue containing fraction is concentrated, followed by an additional clean-up by mini silica gel chromatography and analysed by gas chromatography using a fused silica capillary column (DB-5) and a mass selective detector (MSD).		

White cabbage, rape (seed), hop and lettuce (Reichert, 2001, 2000/1014886)

Analyte:	Boscalid	GC-MSD	DFG method S19
LOQ:	0.01 mg/kg for white cabbage and lettuce, 0.02 mg/kg for rape seed, 0.05 mg/kg for hop.		
Description	White cabbage, hop and lettuce are extracted with acetone, rape seed with acetone/acetonitrile. The extract is cleaned-up by means of gel permeation chromatography and additionally by means of a silica gel chromatography. The determination is performed by GC-MSD.		

Plant matrices (Abdel-Baky and Jones, 2001b, 2001/5001019)

Analyte:	Boscalid	LC/MS/MS	Method 9908
LOQ:	0.05 mg/kg		
Description	Boscalid are extracted with a 70:25:5 methanol:water:2N HCl mixture. An aliquot of the extract is removed and cleaned by either liquid/liquid partition or by Polar Plus C18 speedisk and/or silica speedisk column chromatography. If further cleaning is needed, the elute from the Polar Plus C18 speedisk column is then applied to a Silica gel speedisk column. The final chromatographic analysis of boscalid is determined by LC/MS/MS. The limit of quantitation of the method for boscalid is 0.05 mg/kg.		

Plant and turf cloth matrices (Abdel-Baky and Jones, 2001a, 2001/5000977)

Analyte:	Boscalid	GC-MSD	Method D0008
LOQ:	0.05 mg/kg		
Description	Boscalid was extracted from plant material (except oil) with a 70:25:5 methanol:water:HCl mixture. From oil, it was extracted by liquid/liquid partitioning with acetonitrile/hexane. An aliquot of the extract was removed and cleaned by liquid/liquid partitioning using iso-octane followed by further purification on a Silica gel speedisk column. The final chromatographic analysis of boscalid residues in plants was performed by gas chromatography with a mass selective detector (GC/MS).		

Animal commodities (Weeren and Pelz, 1999, 2000/1000221)

Analyte:	Boscalid	GC-ECD	DFG method S19
LOQ:	0.01 mg/kg for milk, 0.02 mg/kg for meat, egg and fat.		
Description	The sample material is extracted with acetone. Water is added beforehand in an amount that takes full account of the natural water content of the sample so that during extraction the acetone:water ratio remains constant at 2:1 (v:v). For liquid/liquid partition, ethyl acetate/cyclohexane (1+1) and sodium chloride is added and after repeated mixing, excess water is separated. The evaporated residue of an aliquot of the organic phase is cleaned up by gel permeation chromatography on Bio Beads S-X3 polystyrene gel using a mixture of ethyl acetate/cyclohexane (1+1) as eluant and an automated gel permeation chromatograph. The residue containing fraction is concentrated, additionally cleaned-up by mini silica gel chromatography and analysed by gas chromatography using a fused silica capillary column (DB-5) and an electron capture detector (ECD).		

Animal commodities (Grosshans, 2000a, 2000/1017223)

Analyte:	Boscalid, M510F01	HPLC-MS/MS	Method 471/0
LOQ:	0.01 mg/kg for milk, cream, egg, 0.0025 mg/kg for meat, fat, liver and kidney.		
Description	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 ß-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.		

Animal commodities (Fabian,2000, 2000/1017224)

Analyte:	Boscalid	GC-MSD	Method 476/0
LOQ:	0.01 mg/kg.		
Description	The method 476 was developed to determine bound residues of boscalid in liver. It was also possible to apply the method on milk extracts to determine minor milk metabolites. Acetonitrile and concentrated acetic acid are added to the liver sample. In the case of milk, an acetonitrile extract is taken and concentrated acetic acid is added. The mixture is treated for 0.5 hours at 170°C in the microwave oven. The mixture is evaporated to a crude solution and a liquid / liquid partition against saturated sodium chloride solution is carried out. The pH is adjusted to about pH 12 with potassium hydroxide. A liquid / liquid partition with iso-octane is carried out. The organic phase is purified on SPE Silica (liver and milk) and C18 (liver), respectively. The final determination is performed by GC/MS.		

Animal commodities (Class, 2000, 2000/1017227)

Analyte:	Boscalid, M510F01	GC-ECD	DFG method S19
LOQ:	0.01 mg/kg for milk, 0.0025 mg/kg for meat, fat, liver kidney and egg.		
Description	Residues of boscalid and its metabolite M510F01 (present also as a conjugate) are extracted from animal matrices by methanol. An aliquot of the filtered extract is concentrated and treated with enzymes (β-glucuronidase/arylsulfatase) for deconjugation of the metabolite. Water, acetone, sodium chloride and ethyl acetate/cyclohexane (1/1) are added to achieve a homogeneous partition of the analytes into the organic phase. An aliquot of the organic extract is cleaned-up by gel permeation chromatography followed by acetylation of the phenolic metabolite M510F01 with acetic anhydride and further fractionation on silica gel. The determination of boscalid and the acetylated metabolite M510F01 is achieved by gas chromatography with electron capture detection (GC/ECD).		

Recovery data of fortified samples in various matrices from the internal and independent laboratory validation testing are presented in Table 12.

Table 12. Validation data for analytical methods for the determination of boscalid residues in food (anonymous, 2006, 2006/1015800).

Sample Matrix	Fortific. Level [mg/kg]	Average recovery [%]	RSD [%]	No. of analyses	Method	Ref
Apple, fruit	0.05 0.5	94.9 88.1	1.8 13.3	5 5	Method 445/0	2000/1012404
Sour cherry, fruit	0.05 0.5	91.3 86.1	4.9 3.5	5 5		
Grapes, fruit	0.05 1.0	97.0 102.9	2.3 10.9	5 5		
Strawberry, fruit	0.05 0.5	102.1 103.5	2.5 8.2	5 5		
Carrot, root	0.05 0.5	87.3 85.3	2.9 4.6	5 5		
Onion, bulb	0.05 0.5	101.0 98.4	5.7 5.9	5 5		
Tomato, fruit	0.05 0.5	97.8 89.8	11.1 0.9	5 5		
Broccoli, plant w/o root	0.05 0.5	108.8 94.3	18.5 2.2	5 5		
White cabbage, head	0.05 0.5	89.8 92.8	9.3 3.8	5 5		
Leek, plant w/o root	0.05 1.0	84.6 80.3	15.3 13.5	5 5		
Dwarf bean, pods w. seed	0.05 0.5	95.9 92.7	6.5 3.8	5 5		
Oilseed rape, seed	0.05 0.5	90.5 94.7	10.5 1.8	5 5		
Cereal, grain	0.01 0.1 1.0	94.4 100.7 104.5	18.8 15.3 14.4	9 6 2	Method 514/0	2002/1004107
Tomato	0.01 0.1	94 93	8.9 4.2	5 5	DFG method S19	1999/1014886
Lemon	0.01 0.1	100 / 94 [1)] 101 / 98 [1)]	8.9 / 8.2 [1)] 6.2 / 1.4 [1)]	5 / 5 [1)] 5 / 5 [1)]		
Wheat, grain	0.01 0.1	93 83	5.8 4.5	5 5		
Oilseed rape, seed	0.02 0.2	86 82	14 10	5 5		
White cabbage	0.01 0.1	70 77	6 9	5 5	DFG method S19	1999/1014886
Oilseed rape, seed	0.02 0.2	71 76	10 9	5 5		
Hop	0.05 0.5	63 56	9 16	5 5		
Lettuce	0.01 0.1	71 78	9 10	5 5		
Snap bean	0.05 0.5	98 91	14 2	5 5	Method 9908	2001/5001019
Peanut, nutmeat	0.05 0.5	85 92	8 6	5 5		
Canola, seed	0.05 0.5	109 90	5 6	5 5		

Sample Matrix	Fortific. Level [mg/kg]	Average recovery [%]	RSD [%]	No. of analyses	Method	Ref
Canola, oil	0.05 0.5	104 97	3 5	5 5		
Tomato	0.05 0.5	113 90	3 3	5 5		
Lettuce	0.05 0.5	112 89	8 5	5 5		
Canola, seed	0.05 3.5	88 92	13 5	2 2	Method D0008	2001/5000880
Tomato, fruit	0.05 1.0	94 83	4 6	2 2		
Milk	0.01 0.1	78 91	8.6 3.3	5 5	DFG method S19	2000/1000221
Meat	0.02 0.2	100 100	6.3 7.8	5 5		
Egg	0.02 0.2	85 98	5.3 4.9	5 5		
Fat	0.02 0.2	92 106	5.7 4.0	5 5		
Cow, milk	0.01 0.1	86.0 88.7	3.6 7.7	5 5	Method 471/0	2000/1017224
	0.01 0.1	88.4 84.9	5.8 8.6	5 5		
Cow, cream	0.01 0.1	72.2 89.9	1.5 4.7	5 5		
	0.01 0.1	89.5 94.2	1.7 2.3	5 5		
Cow, muscle	0.025 0.25	86.4 94.5	4.0 1.5	5 5		
	0.025 0.25	89.3 86.3	2.1 1.4	5 5		
Cow, fat	0.025 0.25	80.0 81.0	5.4 8.5	5 5		
	0.025 0.25	81.0 82.6	4.0 7.4	5 5		
Cow, kidney	0.025 0.25	83.3 90.6	1.9 3.9	5 5		
	0.025 0.25	81.6 82.2	2.5 4.6	5 5		
Cow, liver	0.025 0.25	86.7 96.0	6.3 8.7	5 5		
	0.025 0.25	90.9 91.5	10.3 6.2	5 5		
Hen, egg	0.01 0.1	82.5 93.1	3.8 3.1	5 5		
	0.01 0.1	82.7 89.1	6.1 8.2	5 5		
Cow, milk	0.01 0.1	95.0 100.0	4.5 4.2	5 5	Method 476/0	2000/1017224
Cow, liver	0.05 0.5	91.0 97.9	2.7 3.3	5 5		

Sample Matrix	Fortific. Level [mg/kg]	Average recovery [%]	RSD [%]	No. of analyses	Method	Ref
Cow, milk	0.01	82	12	5	DFG method S19	2000/1017227
	0.1	88	6	5		
	0.01	93	16	5		
	0.1	101	8	5		
Cow, muscle	0.025	95	6	5		
	0.25	84	6	5		
	0.025	93	14	5		
	0.25	92	15	5		
Cow, fat	0.025	105	15	5		
	0.25	91	10	5		
	0.025	85	9	5		
	0.25	86	17	5		
Cow, kidney	0.025	93	13	5		
	0.25	89	9	5		
	0.025	87	9	5		
	0.25	99	4	5		
Cow, liver	0.025	91	15	5		
	0.25	83	7	5		
	0.025	89	15	5		
	0.25	86	19	5		
Hen, egg	0.025	97	17	5		
	0.25	89	4	5		
	0.025	80	14	5		
	0.25	78	12	5		
Cow, milk	0.01	83.8	4	5	DFG method S19	2000/1017226
	0.1	95.4	4	5		
	0.01	97.3	11	5		
	0.1	107.3	5	5		
Cow, liver	0.025	74.2	3	5		
	0.25	74.2	1	5		
	0.025	91.9	3	5		
	0.25	92.7	5	5		
Cow, milk	0.01	79	1	2	Method 471/0	2002/5002983
	0.1	80	5	2		
	0.01	96	7	2		
	0.1	83	8	2		
Hen, egg	0.01	91	7	2		
	0.1	89	3	2		
	0.01	93	4	2		
	0.1	89	1	2		
Cow, liver	0.025	74	4	2		
	0.25	82	12	2		
	0.025	86	4	2		
	0.25	88	6	2		

Extraction efficiency of analytical methods

Method No. 445/0 (Funk and Mackenroth, 2001, 2000/1012404) was used as the data generation method for fixing the maximum residue levels whereas the multi residue method 19 (Weeren and Pelz, 1999, 1999/11461) was proposed for monitoring purposes. As the extraction procedure used in method 445/0 and the multi residue method S19 slightly deviates from those used in the metabolism studies (Veit, 2001, 2000/1014861; Rabe and Schlüter, 2001, 2000/1014860; Hamm, 1999, 1999/11240; Hamm and Veit, 2001, 2000/1014862), ^{14}C-boscalid treated plant material was extracted according to these methods, the results of which are compared and summarized in Table 13 (Bross, 2001, 2001/1001739).

The results show that comparable or slightly higher amounts of radioactivity were released by extraction with methanol/water/hydrochloric acid (70/25/5) and acetone/water (70/30). The extractability with methanol/water/HCl ranged from 62.5% TRR (wheat straw) to 99.0% TRR (green bean). For acetone/water, the extractability ranged from 60.9% TRR (wheat grain) to 98.8% TRR (green bean). The HPLC metabolite profiles were comparable with the profiles obtained in the course of the metabolism studies.

Table 13. Comparison of extractability of boscalid obtained with different extraction solvents (Bross, 2001, 2001/1001739).

Plant material		Extraction results					
		Metabolism study		Method 445/0		Multi method S 19	
		mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR
Green beans	TRR	1.027	100	0.901	100	0.934	100
	ERR	1.010	98.3	0.892	99.0	0.923	98.8
	RRR	0.017	1.7	0.009	1.0	0.011	1.2
Dry beans	TRR	0.205	100	0.151	100	0.162	100
	ERR	0.165	80.5	0.129	85.4	0.141	87.0
	RRR	0.040	19.5	0.022	14.6	0.021	13.0
Grapes	TRR	1.181	100	1.291	100	1.185	100
	ERR	1.100	93.2	1.126	87.2	1.115	94.1
	RRR	0.081	6.8	0.165	12.8	0.070	5.9
Lettuce	TRR	0.067	100	0.069	100	0.071	100
	ERR	0.063	94.1	0.065	94.2	0.067	94.4
	RRR	0.004	5.9	0.004	5.8	0.004	5.6
Wheat grain	TRR	0.023	100	0.024	100	0.023	100
	ERR	0.008	35.4	0.015	62.5	0.014	60.9
	RRR	0.015	64.6	0.009	37.5	0.009	39.1
Wheat straw	TRR	3.226	100	3.177	100	3.176	100
	ERR	2.487	77.1	2.630	82.8	2.659	83.8
	RRR	0.739	22.9	0.546	17.2	0.516	16.2
Radish roots	TRR	0.098	100	0.095	100	0.101	100
	ERR	0.091	92.8	0.088	92.6	0.092	91.1
	RRR	0.007	7.2	0.007	7.4	0.008	7.9

Stability of residues in stored analytical samples

The Meeting received information on the stability of residues of boscalid in wheat (green plant without roots, grain and straw), oil seed rape, sugar beet (roots), white cabbage (head), peach (fruit), peas, tomato paste, liver, milk and muscle.

The deep freeze stability of boscalid in different plant matrices such as wheat (green plant without roots, grain and straw), oil seed rape, sugar beet (roots), white cabbage (head), peach (fruit) and peas was investigated over a period of two years (Funk and Mackenroth, 2001, 2001/1015028). Untreated samples were fortified with 0.5 mg/kg boscalid. The samples were stored under the usual storage conditions for field samples (polyethylene bottle, -20°C). The samples were analysed with method No. 445/0 (Table 14).

Table 14. Storage stability of boscalid fortified at 0.5 mg/kg in various plant matrices (Funk and Mackenroth, 2001, 2001/1015028).

Day	Boscalid found 1) 2) (mg/kg)															
	Wheat plant		Wheat grain		Wheat straw		Oil seed rape		Sugar beet		White cabbage		Peach		Pea	
0	0.56	0.48	0.47	0.49	0.49	0.50	0.39	0.41	0.49	0.51	0.52	0.49	0.54	0.52	0.49	0.49
33	0.45	0.45	0.40	0.41	0.52	0.53	0.40	0.41	0.47	0.49	0.47	0.46	0.43	0.49	0.49	0.49
96	0.48	0.50	0.45	-	0.48	0.52	0.44	0.46	0.46	0.49	0.52	0.52	0.51	0.50	0.54	0.56
182	0.48	0.45	0.45	0.46	0.46	0.46	0.45	0.44	0.56	0.59	0.52	0.53	0.50	-	0.49	0.51
356	0.53	0.54	0.48	0.46	0.49	0.50	0.46	0.46	0.52	0.52	0.50	0.49	0.54	0.49	0.50	0.51
566	0.43	0.43	0.47	0.48	0.46	0.48	0.47	0.46	0.45	0.46	0.46	0.49	0.45	0.47	0.42	0.45
720	0.42	0.46	0.54	0.52	0.40	0.46	0.38	0.38	0.57	0.51	0.48	0.50	0.53	0.48	0.51	0.52
Degradation after 24 months (%)																
	7.9		stable		10.9		2.2		stable		2.7		2.1		3.7	

1) Corrected for individual procedural recovery.

2) Mean of two replicates.

A representative sample of tomato paste from a process fraction study was placed in a freezer (< -20°C) for 38.6 months. After storage the sample was analysed by method No. D9908. The average residue of boscalid found in the tomato paste sample from the analysis was 1.59 mg/kg. Re-analysis, after storage under deep freeze conditions, showed a mean residue of 1.30 mg/kg.

The freezer stability of boscalid and the metabolite M510F01 in animal matrices was also investigated over a period of 170 days (Grosshans, 2001, 2000/1017229). Untreated samples of muscle, liver and milk from cows were fortified with 0.5 mg/kg with boscalid and M510F01. These matrices were representative for the samples stored during the residue transfer study in cows. All samples were stored under the usual storage conditions for samples (polyethylene bottles, < -18°C). After 0 and approx. 60, 100 and 170 days, samples were analysed using method no. 471. Results are summarized in Table 15.

Table 15. Degradation of boscalid and M510F01 after 166/167 Days (Grosshans, 2001, 2000/1017229).

Tissue	Boscalid [%]	M510F01 [%]
Milk	7.7	-2.9
Muscle	1.8	8.5
Liver	5.2	4.2

USE PATTERN

Boscalid is an anilide fungicide that inhibits mitochondrial respiration, thereby inhibiting spore germination, germ tube elongation, mycelial growth, and sporulation of pathogenic fungi on the leaf surface and is registered for use against a large number of fungi on a wide range of crops in many countries. Labels and English translations were available for all uses. Information on registered uses included in this monograph is generally limited to countries where supervised trials had been conducted, and is summarized in Table 16.

Table 16. Registered uses of boscalid on crops.

Crop	Country	End-use product	F/G/P (a)	Application					PHI [days]
				Method	No. per crop season min. max.	kg ai/hL (b) max.	Water L/ha per appl. Min. max.	kg ai/ha per applic. (b) min. max.	
Apple, pear	Belgium	25.2% WG[1)]	F	Spraying	3	0.045	300	0.134	7
Apple, pear	United Kingdom	25.2% WG		Spraying	4	0.013 – 0.067	300 – 1500	0.202	7
Stone fruit	USA	25.2% WG	F	Spray	5	NC	NS	0.185 – 0.256	0
Berry group	USA	25.2% WG		Spray	4	NC	NS	0.326 – 0.406	0
Grape (except Concord, Worden, Fredonia, Niagara and related varieties)	USA	25.2% WG		Spray	6	NC	NS	0.14 – 0.185	14
Grape (except Concord, Worden, Fredonia, Niagara and related varieties)	USA	25.2% WG		Spray	5	NC	NS	0.14 – 0.22	14
Grapes	USA	70% WG		Spray	5	NC	NS	0.22	14
Grapes	USA	70% WG		Spray	3	NC	NS	0.392	14
Grapes	Japan	WG 500g/kg	F	Spraying	3	0.033-0.050	2000-7000	0.667-3.5	7
Strawberry	Belgium	26.7% WG[3)]	F/G	Spraying	2	0.048	1000	0.481	3
Strawberry (outdoor)	United Kingdom	26.7% WG	F	Spraying	2	0.024 – 0.048	1000 – 2000	0.481	3
Strawberry (protected)	United Kingdom	26.7% WG	G	Spraying	2	0.024 – 0.107	450 – 2000	0.481	3
Strawberry	Japan	WG 500g/kg	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Banana	USA	50% WG	F	Spray	4	0.500 – 0.833 (in the oil/water mixture)	18 – 30 L oil/water mixture, where oil is added as a constant with always (5) 7 – 9 L	0.150	0
Bulb vegetables	USA	25.2% WG		Spray	6	NC	NS	0.256 – 0.326	7
Bulb vegetables	USA	25.2% WG		Spray	6	NC	NS	0.326	7
Onion	Japan	WG 500g/kg	F	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Leek	Belgium	26.7% WG	F	Spraying	2	0.100	400	0.400	14
Leek	Netherlands	26.7% WG	F	Spraying	2 – 3	0.100 – 0.160	205 – 400	0.401	14
Broccoli	USA	70% WG		Spray	2	NC	NS	0.294 – 0.441	0
Chinese broccoli (Gai lon)	USA	70% WG		Spray	2	NC	NS	0.294 – 0.441	0
Brussels sprouts	Belgium	26.7% WG		Spraying	3	0.067	400	0.267	14
Brussels sprouts	United Kingdom	26.7% WG	F	Spraying	3	0.027 – 0.133	200 – 1000	0.267	14
Cauliflower	Belgium	26.7% WG		Spraying	3	0.067	400	0.267	14

Crop	Country	End-use product	F/G/P (a)	Application					PHI [days]
				Method	No. per crop season min. max.	kg ai/hL (b) max.	Water L/ha per appl. Min. max.	kg ai/ha per applic. (b) min. max.	
Cauliflower	United Kingdom	26.7% WG	F	Spraying	3	0.027 – 0.133	200 – 1000	0.267	14
Head cabbage	USA	70% WG		Spray	2	NC	NS	0.294 – 0.441	0
Cucurbit vegetables	USA	25.2% WG		Spray	4	NC	NS	0.22 – 0.326	0
Cucurbit vegetables	USA	25.2% WG		Spray	4	NC	NS	0.326	0
Cucurbit vegetables	USA	70% WG		Spray	4	NC	NS	0.319	0
Cucumber	Japan	WG 500g/kg	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Melon	Germany	SC[4)] 200g/L	F	Spraying	1 – 3	0.008 – 0.017	600 – 1200	0.100	3
Melon	Japan	WG 500g/kg	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Watermelon	Japan	WG 500g/kg	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Pepper	USA	70% WG		Spray	6	NC	NS	0.122 – 0.172	0
Eggplant	Japan	500kg WG	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Tomato	USA	70% WG		Spray	6	NC	NS	0.122 – 0.172	0
Tomato	USA	70% WG		Spray	2	NC	NS	0.44 – 0.613	0
Tomato	Japan	WG 500g/kg	F/G	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	1
Cabbage	Japan	500g/kg WG	F	Spraying	2	0.033	1000-3000	0.333-1.0	7
Brassica (outdoor crops of kale, collards (including spring greens), □ cabbage, leafy brassica crops grown for baby leaf production (i.e. crops harvested up to 8 true leaf stage), pak choi, choi sum and komatsuna	United Kingdom	26.7% WG	F	Spraying	3	max. 0.133	min. 200	0.267	14
Leaf herbs (outdoor and protected), leafy brassica crops (protected) grown for baby leaf production (i.e. Harvested up to 8 true leaf stage)	United Kingdom	26.7% WG	F / G (protected)	Spraying	2	max. 0.133	min. 200	0.401	14
Collards (kale; mizuna; mustard greens; mustard spinach; rape greens)	USA	70% WG		Spray	2	NC	NS	0.294 – 0.441	14

Crop	Country	End-use product	F/G/P (a)	Application					PHI [days]
				Method	No. per crop season min. max.	kg ai/hL (b) max.	Water L/ha per appl. Min. max.	kg ai/ha per applic. (b) min. max.	
Chinese cabbage (bok choy) – leafy brassica greens	USA	70% WG		Spray	2	NC	NS	0.294 – 0.441	14
Lettuce (outdoor and protected)	Belgium	26.7% WG	F / G	Spraying	2	0.080	500	0.400	14
Lettuce	Japan	WG 500g/kg	F/G	Spraying	1	0.033-0.050	1000-3000	0.333-1.5	14
Lettuce (outdoor and protected)	United Kingdom	26.7% WG	F / G (protected)	Spraying	2	0.045 – 0.200	200 – 900	0.400	14
Lettuce	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	14
Beans with pod	France	50% WG	F	Spraying	2	0.167	300	0.500	7
Adzuki bean, dry	Japan	WG 500g/kg	F	Spraying	3	0.033-0.050	1000-3000	0.333-1.5	7
Beans with pod	Germany	50% WG	F	Spraying	2	0.167	300 – 600	0.500	7
Beans with pod	Germany	50% WG	G	Spraying	2	0.167	300 – 600	0.500	7
Common bean, dry	Japan	WG 500g/kg	F/G	Spraying	2	0.033-0.050	1000-3000	0.333-1.5	21
Succulent beans (Phaseolus spp., Vigna spp.)	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	7
Succulent beans (Phaseolus spp., Vigna spp.)	USA	70% WG	F	Spray	2	NC	NS	0.294	7
Succulent Peas (edible podded and succulent shelled)	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	7
Soybean, immature seed (= edible podded)	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	7
Beans, dried (Phaseolus spp., Vigna spp.)	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	21
Beans, dried (Phaseolus spp., Vigna spp.)	USA	70% WG	F	Spray	2	NC	NS	0.294	21
Dry beans (except soybeans)	USA	25.2% WG	F	Spray	2	NC	NS	0.176 – 0.264	21
Dry beans (except soybeans)	USA	25.2% WG	F	Spray	2	NC	NS	0.264 – 0.441	21
Peas – dry	USA	70% WG	F	Spray	2	NC	NS	0.392 – 0.539	21
Peas – dry	USA	70% WG	F	Spray	2	NC	NS	0.294	21
Soybean, dry	USA	25.2% WG		Spray	2	NC	NS	0.141 – 0.282	21
Soybean, dry	USA	25.2% WG		Spray	2	NC	NS	0.221 – 0.282	21
Soybean, dry	USA	25.2% WG		Spray	2	NC	NS	0.282	21
Soybean, dry	USA	70% WG		Spray	2	NC	NS	0.172 – 0.270	21
Soybean, dry	USA	70% WG		Spray	2	NC	NS	0.270	21

Crop	Country	End-use product	F/G/P (a)	Application					PHI [days]
				Method	No. per crop season min. max.	kg ai/hL (b) max.	Water L/ha per appl. Min. max.	kg ai/ha per applic. (b) min. max.	
Soybean, dry	USA	70% WG		Spray	2	NC	NS	0.270 – 0.540	21
Carrot	USA	25.2% WG		Spray	6	NC	NS	0.14 – 0.185	0
Carrot	USA	70% WG		Spray	5	NC	NS	0.22	0
Potato	USA	70% WG		Spray	4	NC	NS	0.122 – 0.22	30
Potato	USA	70% WG		Spray	2	NC	NS	0.27 – 0.49	30
Potato	USA	70% WG		Spray	4	NC	NS	0.122 – 0.22	30
Potato	USA	70% WG		Spray	2	NC	NS	0.27 – 0.49	30
Cereals (wheat, barley, rye)	Germany	233 g/L SC 2)	F	Spraying	1	0.086 – 0.175	200 – 400	0.350	Not given
Cereals (winter and spring wheat, winter and spring barley, oats)	United Kingdom	233 g/L SC	F	Spraying	2	0.175	min. 200 L	0.350	Not given
Cereals (barley)	Germany	233 g/L SC	F	Spraying	2	0.086 – 0.175	200 – 400	0.350	Not given
Cereals (rye)	Germany	233 g/L SC	F	Spraying	2	0.086 – 0.175	200 – 400	0.350	Not given
Cereals (wheat)	Germany	233 g/L SC	F	Spraying	2	0.086 – 0.175	200 – 400	0.350	Not given
Tree nuts (except almond, filbert, pecan)	USA	25.2% WG		Spray	4	NC	NS	0.185 – 0.256	14
Almond	USA	25.2% WG		Spray	4	NC	NS	0.185 – 0.256	25
Pecan	USA	25.2% WG		Spray	4	NC	NS	0.185 – 0.256	14
Pistachio	USA	25.2% WG		Spray	4	NC	NS	0.185 – 0.256	14
Filbert	USA	25.2% WG		Spray	4	NC	NS	0.185 – 0.256	14
Canola	USA	70% WG		Spray	2	NC	NS	0.245 – 0.294	21
Peanut	USA	70% WG		Spray	3	NC	NS	0.319 – 0.49	14
Peanut	USA	70% WG		Spray	3	NC	NS	0.392 – 0.49	14
Sunflower	USA	70% WG		Spray	2	NC	NS	0.220 – 0.44	21
Coffee	Brazil	50% WG		Spraying	1	0.015	500 – 1000	0.075	45
Hops (pending)	Germany	25.2% WG	F	Spray	3	0.019	600 – 2700 1.appl: 600 – 1200 2.appl: 1200 – 2300 3.appl: 2300 – 2700	0.114 – 0.504	21
Hops (pending)	France	25.2% WG	F	Spray	3	0.019	600 – 2700	0.114 – 0.504	21

1) contain boscalid (25.2%) and pyraclostrobin (12.8%) as coactive ingredients.
2) contain boscalid (233 g/L) and epoxiconazole (67 g/L) as coactive ingredients.
3) contain boscalid (26.7%) and pyraclostrobin (6.7%) as coactive ingredients.
4) contain boscalid (200 g/L) and kresoxim-methyl (100 g/L) as coactive ingredients.
(a) F = outdoor or field use, G = glasshouse, P = protected
(b) Information given on active substance (as) refers to boscalid only
PHI = pre-harvest interval
NS = not specified in the label
NC = cannot be calculated as water volume is not specified on label

RESIDUES RESULTING FROM SUPERVISED TRIALS

The Meeting received information on supervised field trials for boscalid uses on the following crops.

Apple: Belgium, Germany, France, Italy and the Netherlands	Table 17
Stone fruits: Canada, USA	Table 18
Raspberries, blueberries: USA	Table 19
Strawberry: Denmark, France, Germany, Great Britain, Greece, Italy, Japan, Spain, Sweden, and the Netherlands	Table 20
Grapes: USA, Japan	Table 21
Banana: Colombia, Costa Rica, Ecuador, Honduras, Martinique and Mexico	Table 22
Onion: USA, Japan	Table 23
Leek: Belgium, France, Germany, Great Britain and the Netherlands	Table 24
Broccoli: USA	Table 25
Cabbage: USA, Japan	Table 26
Cauliflower: Denmark, France, Germany, Great Britain and the Netherlands	Table 27
Brussels sprouts: Denmark, France, Germany, Great Britain, Sweden and the Netherlands	Table 28
Cucumbers: USA, Japan	Table 29
Cantaloupe: USA	
Summer squash: USA	
Melon: Italy, Japan, Spain	
Watermelon: Japan	
Tomatoes: USA, Japan	Table 30
Peppers: USA	
Eggplant: Japan	
Mustard greens: USA	Table 31
Lettuce: France, Germany, Japan, Spain, the Netherlands and USA	Table 32
Curly kale: Denmark, Great Britain, Sweden and the Netherlands	Table 33
Beans with pod: Denmark, France, Germany and Spain	Table 34
Peas, edible podded and succulent: USA	Table 35
Soybean, edible podded (immature): USA	Table 36
Beans without pod: USA	Table 37
Field beans: USA, Japan	Table 38
Peas dry: USA	Table 39
Soybean, dry (mature seed): USA	Table 40
Carrot: USA	Table 41
Radish: USA	Table 42
Potato: USA	Table 43

Where residues were not detected, they are reported as below the LOQ. Residue data, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. For trials, included control plots, no control data is given in the tables except where residues in control samples exceeded the LOQ. Residue data is recorded unadjusted for % recovery. Multiple results are recorded in the data tables where the trial design included replicate plots and where separate samples have been identified as being from these replicate plots. Results used to estimate STMRs are double underlined.

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

Conditions of the supervised residue trials were reported in detailed field reports. Most field reports provided data on the sprayers used, plot size, residue sample size and sampling date. In multiple applications, the application rate, spray concentration and water volume may not have been exactly the same for all applications; the recorded values in the supervised trials summary tables are for the final application.

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

Table 17. Results of residue trials with foliar treatment of boscalid conducted in apple (Raunft and Funk, 2001, 2001/1006135; Schulz, 2000, 2001/1000946; Raunft and Funk, 2001, 2001/1015029 Schulz, 2001, 2001/1015046 and Schulz, 2003, 2003/1001291).

Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trail No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany, 2000 *Vehlefanz* (Pinova)	SE	0.20	0.020	1000	4	0 6 14 21 28	fruit	0.30 0.15 0.14 0.14 0.11	2001/1006135 (ACK/06/00)
Germany, 2000 *Stetten a.H.* (Jonagold)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.35 0.36 0.27 0.24 0.16	2001/1006135 (DU2/12/00)

Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trail No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany, 2000 *Eschbach* (Braeburn)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.38 0.32 0.28 0.19 0.19	2001/1006135 (DU4/11/00)
France, 2000 *Cambrai* (Jonagold)	SE	0.20	0.020	1000	4	0 6 13 21 28	fruit	0.55 0.34 0.31 0.17 0.15	2001/1000946 (X 00 62 03)
France, 2000 *St. Loup Terrier* (Jonagold)	SE	0.20	0.020	1000	4	0 7 15 22 28	fruit	0.56 1.24 0.42 0.52 0.43	2001/1000946 (X 00 62 04)
France, 2000 *Buzet sur Baize* (Canada)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.38 0.51 0.39 0.28 0.22	2001/1000946 (X 00 62 05)
France, 2000 *Le Beugnon* (Golden)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.51 0.42 0.42 0.18 0.08	2001/1000946 (X 00 62 06)
Italy, 2000 *Ferrara* *(Red Chief)*	SE	0.20	0.020	1000	4	0 7 13 20 27	fruit	0.36 0.30 0.19 0.20 0.22	2001/1000946 (0025R)
Italy, 2000 *Forli* (Royal Gala)	SE	0.20	0.020	1000	4	0 8 14 22 28	fruit	0.36 0.29 0.24 0.14 0.12	2001/1000946 (0026R)
Belgium, 2001 *Kortenaken* (Jonagold)	SE	0.20	0.020	1000	4	0 6 13 22 27	fruit	0.39 0.37 0.26 0.26 0.16	2001/1015029 (AGR/15/01)
Germany, 2001 *Stetten a. H.* (Golden Delicious)	SE	0.20	0.020	1000	4	0 7 14 21 27	fruit	0.81 0.55 0.52 0.41 0.47	2001/1015029 (DU2/07/01)
France, 2001 *Chevire* (Golden Smoothy)	SE	0.20	0.020	1000	4	0 8 14 20 28	fruit	0.42 0.38 0.35 0.39 0.20	2001/1015029 (FBM/02/01)

Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trail No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Netherlands, 2001 *Groesbeek* (Elstar)	SE	0.20	0.020	1000	4	0 8 13 21 29	fruit	0.24 0.42 0.25 0.26 0.15	2001/1015029 (AGR/16/01)
France, 2001 *Verquieres* (Ozar Gold)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.73 0.65 0.41 0.43 0.47	2001/1015046 (X 01 062 08)
France, 2001 *Verquieres* (Golden Delicious)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.60 0.53 0.51 0.35 0.35	2001/1015046 (X 01 062 09)
Italy, 2001 *Ferrara* (Red Chief)	SE	0.20	0.020	1000	4	0 7 14 21 27	fruit	0.13 0.24 0.13 0.16 0.15	2001/1015046 (0148R)
Italy, 2001 *Ferrara* (Golden Delicious)	SE	0.20	0.020	1000	4	0 7 14 21 28	fruit	0.27 0.20 0.18 0.20 0.18	2001/1015046 (0149R)
Italy, 2001 *Cesena* (Royal Gala)	SE	0.20	0.020	1000	4	0 6 13 20 27	fruit	0.22 0.19 0.13 0.11 0.09	2001/1015046 (0150R)
Germany, 2003 *Vehlefanz* (Piros)	SE	0.20	0.020	1000	4	0 8 15 21 28	fruit	0.37 0.29 0.16 0.16 0.17	2003/1001291 (ACK/11/03) Plot 2
	WG	0.20	0.020	1000	4	0 8 15 21 28	fruit	0.23 0.14 0.13 0.11 0.08	Plot 3
France, 2003 *Rottelsheim* (Golden)	SE	0.20	0.020	1000	4	0 8 15 22 29	fruit	0.24 0.32 0.23 0.25 0.20	2003/1001291 (FAN/18/03) Plot 2
	WG	0.20	0.020	1000	4	0 8 15 22 29	fruit	0.42 0.24 0.19 0.20 0.15	Plot 3

Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trail No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
France, 2003 *Bouloc* (Star Kimson)	SE	0.20	0.020	1000	4	0	fruit	0.92	2003/1001291
						7		0.86	(FTL/15/03)
						14		0.43	Plot 2
						21		0.51	
						28		0.70	
	WG	0.20	0.020	1000	4	0	fruit	0.85	Plot 3
						7		0.49	
						14		0.38	
						21		0.30	
						28		0.29	
Italy, 2003 *Piemonte* (Golden Delicious)	SE	0.20	0.020	1000	4	0	fruit	0.46	2003/1001291
						7		0.35	(ITA/09/03)
						15		0.39	Plot 2
						21		0.32	
						28		0.16	
	WG	0.20	0.020	1000	4	0	fruit	0.55	Plot 3
						7		0.43	
						15		0.17	
						21		0.20	
						28		0.17	

Table 18. Results of residue trials with foliar treatment of boscalid conducted in peach, plum and cherry (Wofford and Abdel-Baky, 2001, 2001/5000831; Leonard and Gooding, 2005, 2005/5000024).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial and treatment No.)
	Formulation	kg ai/ha	kg ai/hL[1)]	Water L/ha	No.				
PEACH									
USA, 1999	WG	0.26			5		fruit		2001/5000831
PA, EPA Region 1			0.050	510-530		0		0.66	(99107-02)
(Red Haven)			0.013	2020-2050		0		0.75	(99107-03)
SC, EPA Region 2			0.053	480-500		0		0.16	(99108-02)
(Contender)			0.013	1980-2050		0		0.19	(99108-02)
GA, EPA Region 2			0.042	550-700		0		0.40	(99109-02)
(Harmony)			0.020	1120-1450		0		0.42	(99109-03)
GA, EPA Region 2 (June Gold)			0.051	490-520	5	0		0.49	(99110-02)
						7		0.32	
						14		0.21	
						21		0.13	
						28		0.15	
			0.010	2500	5	0		0.48	(99110-03)
						7		0.21	
						14		0.21	
						21		0.14	
						28		0.25	
MI, EPA Region 5			0.041	620-650	5	0		0.40	(99111-02)
(Red Haven)			0.014	1840-1900		0		0.33	(99111-02)
TX, EPA Region 6			0.050	460-590		0		0.64	(99112-02)
(Lauring)			0.023	1010-1250		0		0.73	(99112-03)
CA, EPA Region 10			0.037	670-730		0		0.52	(99113-02)
(Red Sun)			0.01	2500-2700		0		0.49	(99113-03)
CA, EPA Region 10			0.028	930-950		0		0.48	(99114-02)
(September Sun)			0.014	1860-1910		0		0.19	(99114-03)
CA, EPA Region 10			0.048	530-550		0		0.32	(99115-02)
(Loadel)			0.021	1250-1280		0		0.32	(99115-03)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial and treatment No.)
	Formulation	kg ai/ha	kg ai/hL[1)]	Water L/ha	No.				
USA, 2004	WG				5	0	fruit		2005/5000024
WA, EPA region 11 (Snow king)		0.26	0.036	722-741				1.19	(2004134)
IL, EPA region 5 (Cresthaven)		0.26-0.27	0.033	772-827				0.49	(2004135)
ON, EPA region 12 (Red Heaven)		0.25-0.26	0.030	844-868				0.62	(2004136)
MN, EPA region 5 (Bailey Hardy)		0.25-0.26	0.027	920-952				0.79	(2004137)
PLUM									
USA, 2001	WG	0.26	0.037	690-730	5	0	fruit	0.57	2001/5000831
MI, EPA Region 5						7		0.55	(99116-02)
(Stanley)						14		0.40	
						21		0.29	
						28		0.23	
			0.012	2040-2160	5	0		0.34	(99116-03)
						7		0.21	
						14		0.27	
						21		0.23	
						28		0.25	
CA, EPA Region 10			0.050	510-530	5	0		0.14	(99117-02)
(July Rosu´s)			0.012	2030-2160		0		0.15	(99117-03)
CA, EPA Region 10			0.045	560-600				0.17	(99118-02)
(Angelino)			0.011	2260-2340				0.32	(99118-03)
CA, EPA Region 10				850-880				0.09	(99119-02)
(French Prune)				1600-1710				0.10	(99119-03)
CA, EPA Region 10				910-950				0.24	(99120-02)
(Howard Sun)				1890-1950				0.25	(99120-03)
OR, EPA Region 12				600-620				0.08	(99308-02)
(Parsons)				1790-1890				0.11	(99308-03)
USA, 2004	WG				5	0	fruit		2005/5000024
ID, EPA region 11 (Empress)		0.26-0.27		933-966	5			0.55	(2004138)
NS, EPA region 1[a] (Blufre)		0.25-0.26		625-645	5			0.70	(2004139)
ON, EPA region 12 (Yellow plum)		0.25-0.28		838-921	5			0.46	(2004140)
MN, EPA region 5 (Alderman)		0.25-0.26		920-952	5			0.17	(2004141)
CHERRY (tart)									
USA, 2001	WG	0.26			5	0	fruit		2001/5000831
NY, EPA Region 1			0.034	760				1.64	(99101-02)
(Montmorency)			0.018	1420				1.42	(99101-03)
MI, EPA Region 5			0.041	620-640				1.31	(99102-02)
(Montmorency)			0.014	1820-1900				1.51	(99102-03)
MI, EPA Region 5			0.041	620-640				1.09	(99103-02)
(Montmorency)			0.014	1820-1900				1.21	(99103-03)
CHERRY (sweet)									
USA, 2001	WG	0.26			5	0	fruit		2001/5000831
MI, EPA Region 5			0.037	690-720				0.76	(99104-02)
(Sommerset)			0.013	2010-2120				0.74	(99104-03)
CA, EPA Region 10			0.044	580-600				0.64	(99105-02)
(Brooks)			0.011	2290-2500				1.00	(99105-03)
WA, EPA Region11			0.055	470				0.91	(99106-02)
(Bing)			0.014	1890-1920				1.50	(99106-03)
USA, 2004	WG	0.23-0.26	0.031	745-844	6	0	fruit		2005/5000024
WA, EPA region 11 (Bing)								1.49	(2004142)

1) average value.

Table 19. Results of residue trials with foliar treatment of boscalid conducted in berries (Versoi and Abdel-Baky, 2000, 2000/5195; Leonard and Gooding, 2005, 2005/5000025).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL[1)]	Water L/ha	No.				
RED RASPBERRIES									
USA, 1999 *NY, EPA Region 1* (Titau)	WG	0.42	0.074	570	4	0 2 4 6 8	fruit	2.69 2.32 1.93 1.58 1.25	2000/5195 (99277)
ON, EPA Region 12 (Meeker)		0.41	0.079	520	4	0		1.49	(99280)
ON, EPA Region 12 (Tulamene)		0.41	0.079	520	4	0		2.00	(99281)
USA, 2004 *MN, EPA Region 5* (Nova)	WG	0.42	0.074	570	4	0		3.45	2005/5000025 (2004143)
OR, EPA Region 12 (Caroline)		0.42	0.060	700	4	0		2.44	(2004144)
QC,EPA Region 5B (Kilarme)		0.40	0.057	600-800	4	0		3.73	(2004145)
BLUEBERRIES									
USA, 1999 *WI, EPA Region 5* (Blue Chop)	WG	0.41	0.087	470	4	0	fruit	1.16	2000/5195 (99278)
OR, EPA Region 12 (Blue Crop)		0.41	0.043	950		0		0.84	(99279)
NY, EPA Region 1 (blue ray, blue crop)		0.41	0.071	580		0		1.27	(99328)
WI, EPA Region 5 (Berkley)		0.43	0.090	480		0		1.26	(99329)
GA, EPA Region 2 (Tift blue)		0.41	0.079	520		0		1.46	(99330)
GA, EPA Region 2 (Climax)		0.41	0.079	520		0		2.34	(99331)
USA, 2004 *PEI,EPA Region 1A* (wild blueberry)	WG	0.41	0.15	270	4	0		4.35	2005/5000025 (2004146)
MI, EPA Region 5 (blue crop)		0.41	0.059	700		0		2.62	(2004149)
MI, EPA Region 5 (blue crop)		0.41	0.059	700		0		2.65	(2004150)
WI, EPA Region 5 (Elliot)		0.42	0.075	560		0		3.79	(2004151)
NS, EPA Region 1A (not known)		0.41	0.059	700		0		6.78	(2004198)
NS, EPA Region 1A (not known)		0.41	0.059	700		0		6.83	(2004199)

1) average value.

Table 20. Results of residue trials with foliar treatment of boscalid conducted in strawberries (Schulz, 2003, 2004/1015928; Johnston, 2004, 2004/7007479; Schulz, 2003, 2004/1015927; Reichert, 2004, 2005/1004969).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
INDOOR									
Japan, 2002	WG	1.25	0.06	2500	3	1	fruit	7.28	na
Gifu						3		6.58	
(Meho)						7		2.58	
Japan, 2002	WG	0.78	0.05	1565	3	1	fruit	2.04	na
Miyazaki						3		0.89	
(Toyonoka)						7		0.82	
Spain, 2003	WG	0.48	0.048	1000	2	0	fruit	0.21	2004/1015928
Andalucía						3		0.23	(ALO/22/03)
(Camarosa)						7		0.16	
Spain, 2003	WG	0.48	0.048	1000	2	0	fruit	0.36	(ALO/23/03)
Andalucía						3		0.27	
(Camarosa)						7		0.12	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	0.79	(FBD/18/03)
Rhône-Alpes						3		0.68	
(Dorselect)						7		0.59	
Italy, 2003	WG	0.48	0.048	1000	2	0	fruit	1.17	(ITA/18/03)
Piemonte						3		0.46	
(Marmolada)						7		0.34	
Spain, 2003	WG	0.48	0.048	1000	2	0	fruit	0.34	2004/7007479
Andalucía						3		0.21	(ALO/14/04)
(Camarosa)						7		0.34	
Spain, 2003	WG	0.48	0.048	1000	2	0	fruit	0.80	(ALO/15/04)
Andalucía						3		0.49	
(Camarosa)						7		0.25	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	0.64	(FTL/10/04)
Alsace						3		0.57	
(Gariguette)						7		0.30	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	1.10	(FBD/09/04)
Rhône-Alpes						3		0.28	
(Marat des Bois)						7		n.a.	
Italy, 2003	WG	0.48	0.048	1000	2	0	fruit	0.39	(ITA/07/04)
Piemonte						3		0.31	
(Alba)						7		0.24	
OUTDOOR									
Germany, 2003	WG	0.48	0.048	1000	2	0	fruit	0.17	2004/1015927
Nordrhein-Westf.						3		0.14	(AGR/29/03)
(Elsanta)						7		0.19	
Denmark, 2003	WG	0.48	0.048	1000	2	0	fruit	0.41	(ALB/20/03)
Fuenen						3		0.38	
(Elsanta)						7		0.16	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	0.39	(FAN/27/03)
Alsace						3		0.17	
(Dorselect)						7		0.20	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	0.75	(FTL/23/03)
Midi-Pyrenées						3		0.42	
(Gariguette)						7		0.42	
France, 2003	WG	0.48	0.048	1000	2	0	fruit	2.03	(FBD/17/03)
Rhône-Alpes						3		1.74	
(Dorselect)						7		0.71	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Great Britain, 2003	WG	0.48	0.048	1000	2	0	fruit	0.47	(OTA/23/03)
Cambridgeshire						3		0.27	
(Elsanta)						7		0.24	
Italy, 2003	WG	0.48	0.048	1000	2	0	fruit	1.16	(ITA/19/03)
Piemonte						3		0.68	
(Marmolada)						7		0.67	
Italy, 2003	WG	0.48		1000	2	0	fruit	1.30	(ITA/20/03)
Piemonte						3		0.69	
(Maya)						7		0.47	
Sweden, 2003	WG	0.48		1000	2	0	fruit	0.23	(HUS/13/03)
Malmo						3		0.15	
(Honeye)						7		0.15	
Germany, 2004	WG	0.48	0.048	1000	2	0	fruit	0.58	2005/1004969
Brandenburg						3		0.34	(ACK/06/04)
(Symphony)						7		0.35	
France, 2004	WG	0.48	0.048	1000	2	0	fruit	0.53	(FBD/08/04)
Rhône-Alpes						3		0.89	
(Marat des Bois)						7		0.49	
France, 2004	WG	0.48	0.048	1000	2	0	fruit	0.39	(FBM/04/04)
Pays de la Loire						3		0.29	
(Marat des Bois)						7		0.41	
France, 2004	WG	0.48	0.048	1000	2	0	fruit	0.75	(FTL/09/04)
Castelmaurou						3		0.45	
(Gariguette)						7		0.26	
Great Britain, 2004	WG	0.48	0.048	1000	2	0	fruit	0.69	(OAT/06/04)
Seven Oaks, Kent						3		0.55	
(Florence)						7		0.48	
Greece, 2004	WG	0.48	0.048	1000	2	0	fruit	1.44	(GRE/10/04)
Macedonia						3		1.87	
(Siscape)						7		0.77	
Italy, 2004	WG	0.48	0.048	1000	2	0	fruit	0.52	(ITA/06/04)
Piemonte						3		0.47	
(Maya)						7		0.39	
Netherlands, 2004	WG	0.48	0.048	1000	2	0	fruit	0.45	(AGR/08/04)
Limburg						3		0.46	
(Elsanta)						7		0.37	

na: not available.

Table 21. Results of residue trials with foliar treatment of boscalid conducted in grapes (Haughey and Abdel-Baky, 2000, 2000/5228; Leonard and Gooding, 2005, 2005/5000023) and Japan.

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
GRAPES									
Japan, 2002	WG	1.5	0.05	3000	3	7	fruit	4.30	na
Iwate						14		3.95	
(Beni-izu)						21		3.92	
Japan, 2002	WG	2.0	0.05	4000	3	7	fruit	5.20	na
Nagano						14		4.16	
(Kyoho)						21		3.84	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999 *NY, EPA region 1* (Aurora)	WG	0.41	0.087	470	3	14	fruit	2.97	2000/5228 (99122)
CA, EPA region 10 (Emperor)		0.41	0.057	720	3	0 7 14 21 28	fruit	0.30 0.43 0.50 0.38 0.28	(99124)
CA, EPA region 10 (Flame Seedless)		0.41	0.055	740	3	14	fruit	0.34	(99126)
CA, EPA region 10 (Zinfandel)		0.41	0.084	490	3	14	fruit	1.50	(99127)
CA, EPA region 10 (Thompson Seedless)		0.41	0.059	700	3	14	fruit	0.65	(99129)
WA, EPA region 11 (White Riesling)		0.41	0.059	700	3	14	fruit	0.29	(99132)
NY, EPA region 1 (Seyval Blau)		0.41	0.043	950	3	14	fruit	2.08	(99123)
CA, EPA region 10 (Thompson Seedless)		0.41	0.028	1460	3	14	fruit	0.36	(99125)
CA, EPA region 10 (Zinfandel)		0.41	0.028	1460	3	14	fruit	1.38	(99128)
CA, EPA region 10 (Thompson Seedless)		0.41	0.029	1420	3	14	fruit	1.26	(99130)
CA, EPA region 10 (Thompson Seedless)		0.41	0.029	1420	3	14	fruit	0.65	(99131)
WA, EPA region 11 (White Riesling)		0.41	0.029	1420	3	14	fruit	0.34	(99133)
USA, 2004 *ON, EPA region 5* (Concord)	WG	0.41	0.041	980-1010	3	14	fruit	3.13	2005/5000023 (2004153)
MN, EPA region 5 (Frontenac)		0.42	0.030	1420	3	14	fruit	0.92	(2004154)
MN, EPA region 5 (ES26-50)		0.41	0.044	940	3	14	fruit	1.83	(2004155)
IL, EPA region 5 (Chardonel)		0.42	0.052	780-830	3	13 14	fruit	2.28	(2004156)

na: not available.

Table 22. Results of residue trials with foliar treatment of boscalid conducted in banana (Wofford, 2004, 2004/5000480).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2004 *Costa Rica* (Williams)	WG	0.150	0.50	30	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.05 < 0.05 < 0.05	2004/5000480 (2003149)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Costa Rica (Williams)		0.150	0.50	30	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.10 < 0.05 < 0.05	(2003150)
Ecuador (Giant Cavendish)		0.150	0.60	25	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 < 0.05 < 0.05 < 0.05	(2003151)
Ecuador (Giant Cavendish)		0.150	0.60	25	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.10 < 0.05 < 0.05	(2003152)
Colombia (Gran Enano)		0.150	0.50	30	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 < 0.05 < 0.05 < 0.05	(2003153)
Colombia (Gran Enano)		0.148	0.50	30	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.18 < 0.05 < 0.05	(2003154)
Honduras (Ecuatoriano)		0.144	0.50	29	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 < 0.05 < 0.05 < 0.05	(2003155)
Honduras (Ecuatoriano)		0.144	0.50	29	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.07 < 0.05 < 0.05	(2003156)
Guatemala (Gran nane)		0.158	0.51	31	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.09 < 0.05 < 0.05	(2003157)
Mexico (Gran nane)		0.154	0.50	31	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.11 < 0.05 < 0.05	(2003158)
Martinique (Cavendish)		0.154	0.50	31	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 0.07 < 0.05 < 0.05	(2003159)
Martinique (Cavendish)		0.154	0.50	31	4	0	wh. Fruit, bagged wh. Fruit unbag. pulp, bagged pulp, unbagged	< 0.05 < 0.05 < 0.05 < 0.05	(2003160)

Table 23. Results of residue trials with foliar treatment of boscalid conducted in onion (Versoi and Abdel-Baky, 2000, 2000/5207; Johnston and Jones, 2005, 2005/5000019).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
GREEN ONION									
USA, 1999 *TX, EPA region 6* (Texas Early White)	WG	0.34	0.16	210	6	7 7	wh. Pl. w/o root wh. Pl. w/o root	2.73	2000/5207 (99177)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
CA, EPA region 10 (Southport White 404)		0.34	0.12	280	6	7 7	wh. Pl. w/o root wh. Pl. w/o root	2.39	(99178)
CA, EPA region 10 (K-99 Bunching)		0.34	0.12	280	6	7 7	wh. Pl. w/o root wh. Pl. w/o root	1.13	(99179)
USA, 2005 *ND; EPA region 5* (Lisbon)	WG	0.33	0.18	180	6	7 7	wh. Pl. w/o root wh. Pl. w/o root	2.01	2005/5000019 (R05104)
QC; EPA region 5b (Performer)		0.34	0.16	210	6	7 7	wh. Pl. w/o root wh. Pl. w/o root	2.20	(R05110)
ONION, bulb									
Japan, 2002 Hokkaido (Iomante)	WG	0.75	0.050	1500	3	1 7 14	bulb	0.006 < 0.005 < 0.005	na
Japan, 2002 Nagano (Kan 70)	WG	0.75	0.050	1500	3	1 7 14	bulb	0.07 0.03 0.006	na
USA, 1999 *PA, EPA region 1* (Stuttgarter)	WG	0.34	0.16	210	6	7	bulb	0.11	2000/5207 (99171)
TX, EPA region 6 (Cimarron)		0.33	0.17	200	6	7	bulb	0.10	(99172)
TX, EPA region 8 (Vega)		0.34	0.15	230	6	7	bulb	0.13	(99173)
CA, EPA region 10 (Red Cerole)		0.34	0.12	280	6	0 0 7 14 14 21 21 28 28	bulb bulb bulb bulb bulb bulb bulb bulb bulb	0.79 0.70 0.22 0.05 0.10 0.08 0.13 0.17 0.11	(99174)
CA, EPA region 10 (Blanco Duro)		0.34	0.12	280	6	7	bulb	0.93	(99175)
OR, EPA region 11 (Yellow Danver)		0.34	0.12	280	6	7	bulb	0.05	(99176)
USA, 2005 *ND; EPA region 5* (Varsity)	WG	0.33	0.18	180	6	7	bulb	< 0.05	2005/5000019 (R05105)
ON; EPA region 5 (Hamlet)		0.34	0.13	260	6	7	bulb bulb	0.78	(R05106)
ON; EPA region 5 (Norstar)		0.34	0.13	260	6	7	bulb	0.92	(R05107)
QC; EPA region 5b (Mountaineer)		0.34	0.13	220	6	7	bulb	2.61	(R05109)

na: not available.

1) average values used for estimation of MRL.

Table 24. Results of residue trials with foliar treatment of boscalid conducted in leek (Raunft *et al.*, 2001, 2001/1006130; Raunft *et al.*, 2001, 2001/1006131; Schulz, 2004, 2004/1015937).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Belgium, 1999	WG	0.400	0.13	300	3	0	pl. w/o root	3.80	2001/1006130
Scherpenheuvel						7		1.70	(AGR/19/99)
(Arbavas)						14		0.79	
						21		0.80	
Germany, 1999	WG	0.400	0.13	300	3	0	pl. w/o root	2.05	(ACK/09/99)
Wustrau						7		1.30	
(Glorina)						14		0.90	
						20		0.42	
Germany, 1999	WG	0.400	0.13	300	3	0	pl. w/o root	4.74	(DU2/14/99)
Hochdorf						7		2.80	
(Alaska)						14		1.90	
						21		1.19	
Netherland, 1999	WG	0.400	0.13	300	3	0	pl. w/o root	4.16	(AGR/18/99)
Ottersum						7		2.52	
(Alaska)						14		0.93	
						21		0.78	
Belgium, 2000	WG	0.400	0.13	300	3	0	pl. w/o root	5.32	2001/1006131
Halen						7		1.56	(AGR/08/00)
(Apollo)						14		1.09	
						20		1.31	
Netherland, 2000	WG	0.400	0.13	300	3	0	pl. w/o root	2.09	(AGR/09/00)
Siebengewald						7		0.86	
(Porinto)						13		0.62	
						20		< 0.05	
Germany, 2000	WG	0.400	0.13	300	3	0	pl. w/o root	3.32	(DU2/09/00)
Horrenberg						7		1.24	
(Verdea)						14		1.16	
						21		0.73	
Germany, 2000	WG	0.400	0.13	300	3	0	pl. w/o root	2.19	(DU4/08/00)
Lambsheim						7		1.34	
(Duwina)						14		1.02	
						21		0.88	
UK, 2000	WG	0.400	0.13	300	3	0	pl. w/o root	3.07	(OAT/10/00)
Alcester						7		1.06	
(Jolant)						14		0.58	
						21		0.46	
France (N), 2003	WG	0.400	0.13	300	3	0	pl. w/o root	4.24	2004/1015937
Alsace						8		2.85	(FAN1203)
(Bleu de Solaise)						14		1.31	
						21		0.062	
France (N), 2003	WG	0.400	0.13	300	3	0	pl. w/o root	4.98	(FBM0603)
Pays de la Loire						7		4.07	
(Sevilla)						14		2.30	
						20		1.60	

Table 25. Results of residue trials with foliar treatment of boscalid conducted in broccoli (Wofford and Abdel-Baky, 2002, 2001/5002616).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2001 *TX, EPA region 6* (not given)	WG	0.448	0.24	190	2	0 3 7 10 14	flower head + stem	1.59 0.86 0.60 0.39 0.11	2001/5002616 (2001216)
CA, EPA region 10 (Marathon)	WG	0.448	0.16	280	2	0 3 7 10 14	flower head + stem	0.98 0.28 0.29 0.20 0.19	(2001217)
CA, EPA region 10 (Marathon)	WG	0.448	0.16	280	2	0 3 7 10 14	flower head + stem	1.58 1.70 1.13 1.16 0.37	(2001218)
CA, EPA region 10 (Marathon)	WG	0.448	0.16	280	2	0 3 7 10 14	flower head + stem	2.70 1.72 1.26 0.88 0.81	(2001219)
CA, EPA region 10 (greenbelt)	WG	0.448	0.16	280	2	0 3 7 10 14	flower head + stem	0.81 0.68 0.49 0.36 0.20	(2001220)
OR, EPA region 10 (Arcadia)	WG	0.448	0.19	240	2	0 3 7 10 14	flower head + stem	1.45 0.76 0.22 0.25 0.09	(2001221)
Germany, 2003 *Rhinweg 9* (Marathon)	WG	0.267	0.089	300	3	0 7 14 21	Flower	1.03 0.18 < 0.05 < 0.05	2004/1015910 (ACK/17/03)
France, 2003 *Rhone-Alpes* (Milady)	WG	0.267	0.089	300	3	0 7 14 20 28	Flower	2.99 0.54 0.20 0.06 < 0.05	(FBD/15/03)
France, 2003 *Medi-Pyrenees* (Coronado)	WG	0.267	0.089	300	3	0 7 15 22	Flower	0.38 0.08 < 0.05 < 0.05	(FTL/19/03)

1) average values used for estimation of MRL.

Table 26. Results of residue trials with foliar treatment of boscalid conducted in cabbage (Wofford and Abdel-Baky, 2002, 2001/5002617).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Japan, 2005 Taitama (Ajio)	WG	0.667	0.033	2000	2	1 7 14	whole	0.70 0.50 0.09	na

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Japan, 2005 Kochi (Kinkei 201 go)	WG	0.667	0.033	2000	2	1 7 14	whole	2.16 0.80 0.19	na
USA, 2001 *PA, EPA region 1* (Market Prize)		0.47	0.13	360	2	0 3 7 10 14	fresh cabbage with wrapper leaves	2.22 1.27 1.03 1.14 0.43	2001/5002617 (2001222)
NC, EPA region 2 (Early Jersey Wakefield)		0.448	0.24	190	2	0 3 7 10 14	fresh cabbage with wrapper leaves	2.33 1.13 0.46 0.32 0.31	(2001223)
FL, EPA region 3 (Everlasting)		0.448	0.21	210	2	0 3 7 10 14	fresh cabbage with wrapper leaves	1.53 1.78 0.94 1.32 1.16	(2001224)
MI, EPA region 5 (Rinda)		0.448	0.19	240	2	0 3 7 10 14	fresh cabbage with wrapper leaves	0.73 0.29 0.35 0.22 0.16	(2001225)
TX, EPA region 6 (Pennant)		0.448	0.24	190	2	0 3 7 10 14	fresh cabbage with wrapper leaves	1.06 0.64 0.47 0.40 0.39	(2001226)
CA, EPA region 10 (Supreme Vantage)		0.437	0.13	330	2	0 3 3 7 7 10 10 14 14	fresh cabbage with wrapper leaves	0.64 0.67 0.81 0.31 0.34 0.48 0.39 0.57 0.70	

na: not available.

1) average values used for estimation of MRL.

Table 27. Results of residue trials with foliar treatment of boscalid conducted in cauliflower (Schulz, 2003, 2004/1015910; Johnston, 2005, 2004/7007476).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Denmark, 2003 *Fuenen* (Aviso)	WG	0.267	0.089	300	3	0 7 14 21	cauliflower	0.08 < 0.05 ≤ 0.05 < 0.05	2004/1015910 (ALB/16/03)
Netherlands, 2003 *Ottersum* (Aviron)	WG	0.267	0.089	300	3	0 8 15 21	cauliflower	< 0.05 < 0.05 ≤ 0.05 < 0.05	(AGR/26/03)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
France, 2003 *Alsace* (Aviso)	WG	0.267	0.089	300	3	0 6 13 21	cauliflower	< 0.05 < 0.05 < 0.05 < 0.05	(FBD/24/03)
UK, 2003 *Bicester* (Thallasa)	WG	0.267	0.089	300	3	0 7 13 20	cauliflower	1.60 1.10 0.36 0.55	(OAT/22/03)
Germany, 2004 *Rheinland-Pfalz* (Lecano)	WG	0.267	0.089	300	3	0 7 15 21	cauliflower	< 0.05 < 0.05 < 0.05 < 0.05	2004/7007476 (DU4/04/04)
France, 2004 *Alsace* (Fremont)	WG	0.267	0.089	300	3	0 7 14 21	cauliflower	0.55 0.17 < 0.05 0.06	(FAN/09/04)
France, 2004 Midi-Pyrenees (Fremont)	WG	0.267	0.089	300	3	0 6 13 21	cauliflower	< 0.05 0.10 < 0.05 < 0.05	(FTL/11/04)

Table 28. Results of residue trials with foliar treatment of boscalid conducted in Brussels sprouts (Klimmek and Schulz, 2004, 2004/1015912; Johnston, 2005, 2004/7007478).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany, 2003 *Brandenburg* (Ikarus)	WG	0.267	0.089	300	3	0 8 13 20	sprouts	0.17 0.25 0.14 0.34	2004/1015912
Denmark, 2003 *Fuenen* (Maximus)	WG	0.267	0.089	300	3	0 7 14 21	sprouts	0.31 0.08 0.10 0.07	
UK, 2003 *Gloucestershire* (Helemus)	WG	0.267	0.089	300	3	0 7 14 21	sprouts	< 0.05 < 0.05 < 0.05 < 0.05	
Netherlands, 2003 *Limburg* (Veloce)	WG	0.267	0.089	300	3	0 6 13 20	sprouts	0.26 0.21 0.12 0.23	
Sweden, 2003 *Malmoe* (Stallion)	WG	0.267	0.089	300	3	0 8 15 22	sprouts	0.23 0.05 0.15 0.07	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany, 2004 *Baden-Württemberg* (Genius)	WG	0.267	0.089	300	3	0 7 14 21	sprouts	0.50 0.41 0.40 0.27	2004/7007478
France, 2004 *Alsace* (Cyrrus)	WG	0.267	0.089	300	3	0 7 13 21	sprouts	0.18 0.16 0.16 0.14	
UK, 2004 *Gloucestershire* (Genius)	WG	0.267	0.089	300	3	0 7 13 21	sprouts	0.13 0.06 < 0.05 < 0.05	
Sweden, 2004 *Malmoe* (Cyrrus)	WG	0.267	0.089	300	3	0 7 15 21	sprouts	0.22 0.08 < 0.05 0.06	

Table 29. Results of residue trials with foliar treatment of boscalid conducted in cucurbits (Haughey and Abdel-Baky, 2001, 2001/5002593; Leonard, 2005, 2005/5000021; Heck *et al*., 1999, 2000/1014874; Schroth, 2000, 2001/1009069).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
CUCUMBER									
Japan, 2002 Gunma (Ona)	WG	1.25	0.05	2500	3	1 3 7	fruit	1.00 0.56 0.26	na
Japan, 2002 Chiba (Sharp 1)	WG	1.00	0.05	2000	3	1 3 7	fruit	2.10 1.04 0.52	na
USA, 2001 *NC, EPA region 2* (National Pickling)	WG	0.35	0.12	290	4	0	fruit	0.14	2001/5002593 (2001262)
GA, EPA region 2 (Long green imp)		0.35	0.13	275	4	0	fruit	0.14	(2001263)
FL, EPA region 3 (Poinsett 76)		0.35	0.12	290	4	0	fruit	0.13	(2001264)
MI, EPA region 5 (Marketmore)		0.35	0.18	200	4	0	fruit	0.07	(2001265)
WI, EPA region 5 (Eureka Hybrid)		0.35	0.18	200	4	0	fruit	0.05	(2001266)
TX, EPA region 6 (Straight 8)		0.35	0.09	400	4	0	fruit	0.07	(2001267)
USA, 2004 *GA, EPA region 2* (Lightning)	WG	0.34	0.13	260	4	0	fruit	0.12	2005/5000021 (2004123)
CA, EPA region 10 (Poinsett 76 Armenian)		0.34	0.12	280	4	0	fruit	0.26	(2004124)
OR, EPA region 12 (Daytona)		0.34	0.12	280	4	0	fruit	0.07	(2004125)
QC, EPA region 5b (Marketmore)		0.32-0.35	0.13	250-280	4	0	fruit	0.31	(2004126)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
SUMMER SQUASH									
USA, 2001 *PA, EPA region 1* (Sunray)	WG	0.35	0.18	200	4	0	fruit	0.12	2001/5002593 (2001274)
NC, EPA region 2 (Straight neck early prolific)		0.34	0.12	280	4	0	fruit	0.14	(2001275)
FL, EPA region 3 (Yellow summer crookneck)		0.35	0.13	280	4	0	fruit	0.16	(2001276)
MI, EPA region 5 (Zucchini Elite)		0.34	0.15	220	4	0	fruit	0.31	(2001277)
CA, EPA region 10 (Sundance)		0.35	0.13	280	4	0	fruit	0.95	(2001278)
USA, 2004 *MN, EPA region 5* (Monet)	WG	0.34	0.14	235	4	0	fruit	0.11	2005/5000021 (2004129)
QC, EPA region 5b (Spineless Beauty)		0.34	0.12	280	4	0	fruit	0.27	(2004130)
OR, EPA region 12 (Golden Zucchini)		0.32-0.37	0.13	260-290	4	0	fruit	0.16	(2004131)
Prince Edw.Island EPA region 1A (Rich Green)		0.34	0.12	280	4	0	fruit	0.19	(2004132)
MELON									
Japan, 2005 Shizuoka (Arus Miyabi)	WG	3.0	0.050	6000	3	1 3 7	fruit except peel	0.03 0.02 0.02	na
Japan, 2005 Ishikawa (Night Natsukei 2 go)	WG	1.25	0.050	250	3	1 3 7	fruit except peel	0.006 0.006 < 0.005	na
(CANTALOUPE)									
USA, 2001 *GA, EPA region 2* (Edisto 47)	WG	0.34	0.13	270	4	0	fruit	0.29	2001/5002593 (2001268)
MI, EPA region 5 (Fire)		0.34	0.17	200	4	0	fruit	0.56	(2001269)
TX, EPA region 6 (Jumbo Hale´s best)		0.34	0.085	400	4	0	fruit	0.23	(2001270)
CA, EPA region 10 (Magnum PMR .45)		0.34	0.12	280	4	0	fruit	1.27	(2001271)
CA, EPA region 10 (Magnum .45)		0.34	0.12	280	4	0	fruit	0.39	(2001272)
CA, EPA region 10 (Mark)		0.34	0.12	280	4	0	fruit	0.71	(2001273)
USA, 2004 *QC, EPA region 5b* (Athena)	WG	0.32-0.34	0.13	240-260	4	0	fruit	0.57	2005/5000021 (2004127)
MN, EPA region 5 (Primo)		0.32-0.34	0.13	240-260	4	0	fruit	0.14	(2004128)
Spain, 1999 *Andalusia* (Cantaloupe)	SC	0.100	0.010	1000	4	0 4 7 13	fruit	< 0.05 < 0.05 < 0.05 < 0.05	2000/1014874 (AC/21/99)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Spain, 1999	SC	0.100	0.010	1000	4	0	fruit	< 0.05	(AC/22/99)
						4		≤ 0.05	
(Sirius)						7		< 0.05	
						13		< 0.05	
Spain, 1999	SC	0.100	0.010	1000	4	0	fruit	< 0.05	(ALO/13/99)
Andalusia						2		≤ 0.05	
(Makdimón F1)						6		< 0.05	
						13		< 0.05	
Spain, 1999	SC	0.100	0.010	1000	4	0	fruit	< 0.05	(ALO/14/99)
Andalusia						3		≤ 0.05	
(Makdimón F1)						7		< 0.05	
						14		< 0.05	
Spain, 2000	SC	0.100	0.010	1000	4	0	fruit	0.064	2001/1009069
Andalucía						3	fruit	< 0.05	(00S008R)
(Sancho)						3	peel	0.066	
						3	flesh	≤ 0.05	
						7	fruit	< 0.05	
						14	fruit	< 0.05	
Spain, 2000	SC	0.100	0.010	1000	4	0	fruit	0.059	(00S009R)
Andalucía						3	fruit	0.061	
(Makdimon)						3	peel	0.106	
						3	flesh	≤ 0.05	
						7	fruit	0.064	
						14	fruit	0.072	
Italy, 2000	SC	0.100	0.010	1000	4	0	fruit	< 0.05	(00I010R)
Lombardia						3	fruit	< 0.05	
(Supermarket)						3	peel	< 0.05	
						3	flesh	≤ 0.05	
						7	fruit	< 0.05	
						14	fruit	< 0.05	
Italy, 2000	SC	0.100	0.010	1000	4	0	fruit	< 0.05	(00I011R)
Piemonte						3	fruit	< 0.05	
(Supermarket)						3	peel	< 0.05	
						3	flesh	≤ 0.05	
						7	fruit	< 0.05	
						14	fruit	< 0.05	
WATERMELON, INDOOR									
Japan, 2005	WG	1.5	0.050	3000	3	1	fruit except peel	0.02	na
Ibaraki						3		0.04	
(Benikodama)						7		0.04	
Japan, 2005	WG	1.0	0.050	2000	3	1	fruit except peel	0.04	na
Isikawa						3		0.02	
(Ajihimitsu)						7		0.02	

na: not available

1) average values used for estimation of MRL.

Table 30. Results of residue trials with foliar treatment of boscalid conducted in fruiting vegetables (Haughey and Abdel-Baky, 2001, 2001/5000832; Johnston, 2005, 2005/5000016; Versoi and Abdel-Baky, 2000, 2000/5209).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
TOMATO									
Japan, 2002	WG	1.0	0.05	2000	3	1	fruit	0.85	na
Ibaraki						3		0.51	
(House-Taro)						7		0.65	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Japan, 2002 Kumamoto (House-Taro)	WG	1.0	0.05	2000	3	1 3 7	fruit	1.09 0.56 0.34	na
USA, 2000 *PA, EPA region 1* (Mountain spring)	WG	0.616	0.21	290	2	0	fruit	0.27	2001/5000832 (2000204)
NC, EPA region 2 (Homestead)		0.616	0.21	290	2	0	fruit	0.22	(2000205)
FL, EPA region 3 (Sunny)		0.616	0.11	580	2	0	fruit	0.24	(2000206)
FL, EPA region 3 (Asgrow FL-47)		0.616	0.11	580	2	0	fruit	0.21	(2000207)
MI, EPA region 5 (Celebrity)		0.616	0.21	290	2	0	fruit	0.30	(2000208)
CA, EPA region 10 (9557)		0.616	0.21	290	2	0	fruit	0.79	(2000210)
CA, EPA region 10 (UF6203)		0.616	0.16	380	2	0	fruit	0.25	(2000211)
CA, EPA region 10 (U 370)		0.616	0.13	470	2	0	fruit	0.59	(2000212)
CA, EPA region 10 (La Roma Red)		0.616	0.13	470	2	0	fruit	0.17	(2000213)
CA, EPA region 10 (3155)		0.616	0.27	230	2	0	fruit	0.92	(2000214)
CA, EPA region 10 (Hypeel 108)		0.616	0.16	380	2	0	fruit	0.28	(2000215)
CA, EPA region 10 (La Roma)		0.616	0.22	280	2	0 5 11 15 20	fruit	0.61 0.53 0.56 0.59 0.23	(2000209)
USA, 2004 *ND, EPA region 5* (Brandywine)	WG	0.43	0.15	290	3	0	fruit	0.56	2005/5000016 (2004113)
ND, EPA region 5 (Early Girl Hybrid)		0.42	0.15	280	3	0	fruit	0.21	(2004114)
MN, EPA region 5 (Sunbrite)		0.41	0.17	240	3	0	fruit	0.28	(2004115)
MN, EPA region 5 (Sunbeam)		0.41	0.17	240	3	0	fruit	0.20	(2004116)
ON, EPA region 5 (C337)		0.41	0.15	280	3	0	fruit	0.35	(2004117)
ON, EPA region 5 (1069)		0.41	0.14	290	3	0	fruit	0.26	(2004118)
QC, EPA region 5B (Pachero)		0.40	0.18	220	3	0	fruit	0.56	(2004119)
EGGPANT									
Japan, 2002 Ibaraki (Senryo 2 go)	WG	0.915	0.05	1830	3	1 3 7	fruit	0.61 0.45 0.11	na
Japan, 2002 Nagano (Chikuyo)	WG	1.0	0.05	2000	3	1 3 7	fruit	0.93 0.40 0.32	na
PEPPER, non bell									
USA, 1999 *OK, EPA region 8* (Big Chili)	WG	0.168	0.086	130-260	6	0	fruit	0.83	2000/5209 (99349)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
TX, EPA region 8 (Anaheim TMR 23)		0.168	0.073	230	6	0	fruit	0.30	(99350)
NM, EPA region 9 (Sonora)		0.168	0.076	200-240	6	0	fruit	0.14	(99351)
USA, 2004 *MN, EPA region 5* (Ancho Villa)	WG	0.41	0.18	230	3	0	fruit	0.54	2005/5000016 (2004120)
PEPPER, bell									
USA, 1999 *GA, EPA region 2* (Camelot)	WG	0.168	0.084	210-290	6	0	fruit	0.09	2000/5209 (99345)
FL, EPA region 3 (California Wonder)		0.168	0.059	280-290	6	0	fruit	0.16	(99346)
IA, EPA region 5 (California Wonder)		0.168	0.084	160-240	6	0	fruit	≤ 0.05	(99347)
OK, EPA region 6 (California Wonder)		0.160	0.078	150-260	6	0	fruit	0.14	(99348)
CA, EPA region 10 (Torres)		0.168	0.044	380	6	0	fruit	0.30	(99352)
CA, EPA region 10 (Torres)		0.168	0.044	380	6	0	fruit	0.08	(99353)
USA, 2004 *ON, EPA region 5* (Revolution)	WG	0.41-0.51	0.15	290-340	3	0	fruit	0.18	2005/5000016 (2004121)
QC, EPA region 5B (Crusader)		0.38-0.42	0.19	220-245	3	0	fruit	1.35	(2004122)

na: not available.

1) average values used for estimation of MRL.

Table 31. Results of residue trials with foliar treatment of boscalid conducted in mustard greens (Wofford and Abdel-Baky, 2001, 2001/5003339; Leonard, 2005, 2005/7002859).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2001 *NC, EPA region 2* (Florida Broadleaf)	WG	0.45	0.24	190	2	0 3 7 10 14	green leaves	25.9 17.3 17.9 13.1 12.9	2001/5003339 (2001307)
MS, EPA region 4 (Florida Broadleaf)	WG	0.45	0.38	120	2	0 3 7 10 14	green leaves	49.0 25.5 20.3 10.8 14.4	(2001308)
WI, EPA region 5 (Florida Broadleaf India Mustard)	WG	0.45	0.24	190	2	0 3 7 10 14	green leaves	36.0 2.90 0.96 0.44 0.54	(2001309)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
TX, EPA region 6 (Southern Giant Curled Mustard)	WG	0.45	0.16	290	2	0 3 7 10 14	green leaves	21.5 6.64 5.48 4.00 2.80	(2001310)
CA, EPA region 10 (Florida Broadleaf)	WG	0.45	0.16	280	2	0 3 7 10 14	green leaves	41.1 24.9 12.6 19.5 6.04	(2001311)
USA, 2004/05 *GA, EPA region 2* (Florida Broadleaf)		0.45	0.24	188	2	0	green leaves	15.6	2005/7002859 (2004110)
FL, EPA region 3 (Southern Giant Curled Mustard)		0.45	0.28	158	2	0	green leaves	16.0	(2004111)
CA, EPA region 10 (Florida Broadleaf)		0.45	0.19	235	2	0	green leaves	28.1	(2004112)
GA, EPA region 2 (Southern Giant Curled Mustard)		0.45	0.35	130	2	0 3 7 14	green leaves	12.7 10.8 5.17 0.92	(R05021)
FL, EPA region 3 (Southern Giant Curled Mustard)		0.45	0.38	120	2	0 3 7 14	green leaves	12.7 1.63 1.31 0.45	(R05022)
CA, EPA region 10 (Florida Broadleaf)		0.45	0.15	300	2	3 7 15	green leaves	7.52 4.69 3.10	(R05023)

1) average values used for estimation of MRL.

Table 32. Results of residue trials with foliar treatment of boscalid conducted in lettuce (Haughey and Abdel-Baky, 2001, 2001/5000051; Beck *et al*., 2001, 2001/1000998; Schulz, 2001, 2001/1000933; Beck *et al*., 2001, 2001/1000999; Young and Atkinson, 2003, 2003/1001259).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
HEAD LETTUCE with wrapper leaves									
USA, 2000 *NC, EPA region 2* (Crisp head)	WG	0.56	0.20	280	2	15	head	1.77	2001/5000051 (2000132)
FL, EPA region 3 (Great Lakes)	WG	0.56	0.20	280	2	13	head	2.73	(2000133)
CA, EPA region 10 (Empire)	WG	0.56	0.15	380	2	14	head	0.98	(2000135)
CA, EPA region 10 (Salinas)	WG	0.56	0.15	380	2	14	head	2.68	(2000136)
CA, EPA region 10 (Great Lakes)	WG	0.56	0.12	470	2	14	head	5.42	(2000137)
AZ, EPA region 10 (Green Lightning)	WG	0.56	0.20	280	2	14	head	3.18	(2000138)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
AZ, EPA region 10 (Diamond)	WG	0.56	0.20	280	2	14	head	2.53	(2000139)
CA, EPA region 10 (Bayview)	WG	0.56	0.20	280	2	0 7 14 21 28	head	5.85 0.40 0.11 0.07 < 0.05	(2000134)
HEAD LETTUCE without wrapper leaves									
USA, 2000 *NC, EPA region 2* (Crisp head)	WG	0.56	0.20	280	2	15	head	0.93	2001/5000051 (2000132)
FL, EPA region 3 (Great Lakes)	WG	0.56	0.20	280	2	13	head	0.42	(2000133)
CA, EPA region 10 (Empire)	WG	0.56	0.15	380	2	14	head	0.17	(2000135)
CA, EPA region 10 (Salinas)	WG	0.56	0.15	380	2	14	head	0.41	(2000136)
CA, EPA region 10 (Great Lakes)	WG	0.56	0.12	470	2	14	head	< 0.05	(2000137)
AZ, EPA region 10 (Green Lightning)	WG	0.56	0.20	280	2	14	head	0.72	(2000138)
AZ, EPA region 10 (Diamond)	WG	0.56	0.20	280	2	14	head	0.27	(2000139)
AZ, EPA region 10 (Bayview)	WG	0.56	0.20	280	2	0 7 14 21 28	head	0.32 0.09 < 0.05 < 0.05 < 0.05	(2000134)
LEAF LETTUCE									
Japan, 2005 Hyogo (Smily)	WG	1.0	0.050	2000	1	14 21 28	leaves	0.87 < 0.05 < 0.05	na
Japan, 2005 Wakayama (Shizuka)	WG	1.0	0.050	2000	1	14 21 28	leaves	0.89 2.29 0.16	na
USA, 2000 *NC, EPA region 2* (Salad Bowl)	WG	0.56	0.20	280	2	14	leaves	9.55	2001/5000051 (2000140)
FL, EPA region 3 (Bibb)	WG	0.56	0.20	280	2	13	leaves	0.74	(2000141)
CA, EPA region 10 (Waldmans Green)	WG	0.56	0.15	380	2	14	leaves	5.14	(2000143)
CA, EPA region 10 (Red Salad Bowl)	WG	0.56	0.15	380	2	14	leaves	1.60	(2000144)
CA, EPA region 10 (Waldmans Green)	WG	0.56	0.12	470	2	14	leaves	1.91	(2000145)
AZ, EPA region 10 (Paris Island)	WG	0.56	0.20	280	2	14	leaves	4.87	(2000146)
AZ, EPA region 10 (Shining Star)	WG	0.56	0.20	280	2	14	leaves	9.36	(2000147)
CA, EPA region 10 (New Red Fire)	WG	0.56	0.20	280	2	0 7 14 21 28	leaves	17.0 10.1 1.63 0.33 0.08	(2000142)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
LETTUCE, EUROPE OUTDOOR									
Germany, 1999 *Brandenburg* (Enrica)	WG	0.400	0.080	500	2	0 7 14 21	head	10.3 1.09 0.09 < 0.05	2001/1000998 (ACK/06/99)
Germany, 1999 *Baden-Württemberg* (Einstein)	WG	0.400	0.080	500	2	0 7 14 21	head	9.64 0.87 0.38 0.10	(DU2/11/99)
Germany, 1999 *Rheinland-Pfalz* (Einstein)	WG	0.400	0.080	500	2	0 5 13 20	head	20.5 5.54 0.64 0.30	(DU4/08/99)
Spain, 1999 *Andalucía* (Yerga)	WG	0.400	0.080	500	2	0 7 13 20	head	7.74 2.79 0.45 0.11	(AC/14/99)
Spain, 1999 *Andalucía* (Yerga)	WG	0.400	0.080	500	2	0 7 13 20	head	8.38 3.74 0.36 0.17	(AC/15/99)
Spain, 1999 *Andalucía* (Little gem)	WG	0.400	0.080	500	2	0 7 13 20	head	12.6 2.45 0.73 < 0.05	(AC/16/99)
France, 1999 *Côte dÓr* (Titan)	WG	0.400	0.080	500	2	0 7 14 21	head	13.8 1.27 0.65 0.13	(FR4/01/99)
Netherlands, 1999 *Limburg* (Enrica)	WG	0.400	0.080	500	2	0 6 14 22	head	6.67 1.24 0.33 0.30	(AGR/13/99)
France, 1999 *Provence Alpes-* *Côte dÁzur* (Santa Fe)	WG	0.400	0.13	300	2	0 7 14 21	head	12.4 1.56 0.21 < 0.05	2001/1000933 (X 99 62 11)
France, 1999 *Aquitaine* (Nadine)	WG	0.400	0.13	300	2	0 7 14 21	head	14.3 2.30 0.50 0.06	(X 99 62 12)
Germany, 2000 *Brandenburg* (Enrica)	WG	0.400	0.080	500	2	0 6 14 22	head	6.17 0.45 1.58 < 0.05	2001/1000999 (ACK/03/00)
Germany, 2000 *Baden-Württemberg* (Einstein)	WG	0.400	0.080	500	2	0 7 14 21	head	8.17 0.62 < 0.05 < 0.05	(DU2/05/00)
Spain, 2000 *Andalucía* (Yerga)	WG	0.400	0.080	500	2	0 6 14 20	head	14.2 0.62 0.09 0.86	(AC/15/00)
Spain, 2000 *Andalucía* (Yerga)	WG	0.400	0.080	500	2	0 6 14 21	head	6.44 0.83 0.17 0.076	(AC/16/00)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
France, 2000 *Languedoc-Roussillon* (Rosny)	WG	0.400	0.080	500	2	0 7 14 21	head	9.20 1.47 1.19 0.76	(FR3/06/00)
France, 2000 *Bourgogne* (Titan)	WG	0.400	0.080	500	2	0 7 13 20	head	6.38 0.28 0.15 < 0.05	(FR4/06/00)
France, 2000 *Midi-Pyrénées* (Elselsa)	WG	0.400	0.080	500	2	0 7 14 21	head	5.16 1.41 0.43 0.41	(FR8/05/00)
Netherlands, 2000 *Limburg* (Flandria)	WG	0.400	0.080	500	2	0 7 13 20	head	6.64 0.82 0.39 0.12	(FR4/06/00)
LETTUCE, EUROPE INDOOR									
Germany, 2002 *Brandenburg* (Nadine)	WG	0.400	0.080	500	2	0 7 13 22	head	29.3 2.51 0.72 < 0.05	2003/1001259 (ACK/03/02)
Netherlands, 2002 *Limburg* (Peter)	WG	0.400	0.080	500	2	0 6 14 20	head	21.3 10.9 6.11 2.06	(AGR/08/02)
Spain, 2002 *Andalucía* (Filipus)	WG	0.400	0.080	500	2	0 7 14 21	head	14.9 4.18 5.96 3.21	(ALO/04/02)
Spain, 2002 *Andalucía* (Candela)	WG	0.400	0.080	500	2	0 7 14 21	head	29.9 3.46 0.37 0.05	(AYE/03/02)
France, 2002 *Alsace* (Pantheon)	WG	0.400	0.080	500	2	0 7 14 21	head	14.7 4.60 2.50 1.12	(FAN/04/02)
France, 2002 *Rhone-Alps* (Grenobloise)	WG	0.400	0.080	500	2	0 7 14 21	head	21.0 7.84 2.32 0.84	(FBD/04/02)
France, 2002 *Pays del la Loire* (Angie)	WG	0.400	0.080	500	2	0 7 14 21	head	9.92 9.73 5.63 4.81	(FBM/02/02)
France, 2002 *Midi-Pyrénées* (Alexandria)	WG	0.400	0.080	500	2	0 7 14 21	head	16.6 4.02 1.52 0.45	(FTL/21/02)

1) average values used for estimation of MRL.

Table 33. Results of residue trials with foliar treatment of boscalid conducted in curly kale (green cabbage) (Beck *et al*., 2001, 2001/1001000; Beck and Benz, 2001, 2001/1001001).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Denmark, 2000 *Fuenen* (Winterbor)	WG	0.400	0.13	300	4	0 7 14 20	leaves	7.04 7.77 0.67 1.09	2001/1001000
UK, 2000 *Warwickshire* (Buffalo)	WG	0.400	0.13	300	4	0 8 14 21	leaves	6.63 1.21 0.50 0.69	
Netherlands, 1999 *Limburg* (Buffalo)	WG	0.400	0.13	300	4	0 7 15 22	leaves	10.82 0.14 2.80 1.26	2001/1001001
UK, 1999 *Lincolnshire* (Krypton)	WG	0.400	0.13	300	4	0 6 13 21	leaves	0.34 < 0.05 0.11 0.06	
UK, 1999 *Worcestershire* (Winterbor)	WG	0.400	0.13	300	4	0 7 13 21	leaves	3.33 0.91 0.55 0.43	
Sweden, 1999 *Malmoe* (Arsis)	WG	0.400	0.13	300	4	0 7 14 21	leaves	7.98 3.30 3.20 4.06	

Table 34. Results of residue trials with foliar treatment of boscalid conducted in bean (Treiber *et al*., 2000, 2000/1014846; Treiber *et al*., 2001, 2000/1014850; Perny, 2001, 2000/1014876; Treiber *et al*., 2001, 2000/1014849).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
BEAN (outdoor)									
D – Germany 1999 (Berggold)	WG	0.500	0.17	300	3	0 3 3 7 7 15 15	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	20.2 0.71 43.0 0.47 29.0 0.47 27.4	2000/1014846 (ACK/03/99)
D – Germany 1999 (Primel)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	14.0 0.63 28.5 0.26 12.8 0.18 6.06	(DU2/07/99)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
D – Germany 1999 (Scuba)	WG	0.500	0.17	300	3	0	pl. w/o root	14.5	(D08/02/99)
						3	pods with seed	0.48	
						3	shoots	20.4	
						8	pods with seed	0.22	
						8	shoots	22.2	
						14	pods with seed	0.08	
						14	shoots	6.50	
DK – Denmark 1999 (Bonbon)	WG	0.500	0.17	300	3	0	pl. w/o root	16.4	(ALB/04/99)
						4	pods with seed	0.15	
						4	shoots	10.5	
						8	pods with seed	0.12	
						8	shoots	11.4	
						15	pods with seed	0.13	
						15	shoots	6.75	
D – Germany 2000 (Paulista)	WG	0.500	0.17	300	3	0	pl. w/o root	30.1	2000/1014850 (DU2/10/00)
						3	pods with seed	0.89	
						3	shoots	43.2	
						8	pods with seed	0.67	
						8	shoots	45.6	
						14	pods with seed	0.53	
						14	shoots	44.5	
DK – Denmark 2000 (Bon-Bon)	WG	0.500	0.17	300	3	0	pl. w/o root	22.9	(ALB/02/00)
						3	pods with seed	0.84	
						3	shoots	23.5	
						7	pods with seed	0.50	
						7	shoots	19.8	
						14	pods with seed	0.28	
						14	shoots	16.7	
DK – Denmark 2000 (Bon-Bon)	WG	0.500	0.17	300	3	0	pl. w/o root	24.7	(ALB/03/00)
						3	pods with seed	0.81	
						3	shoots	23.7	
						7	pods with seed	0.83	
						7	shoots	29.7	
						14	pods with seed	0.43	
						14	shoots	22.5	
F – France 2000 (Flagrano)	WG	0.500	0.17	300	3	0	pl. w/o root	18.1	(FR2/02/00)
						4	pods with seed	0.53	
						4	shoots	17.7	
						7	pods with seed	0.26	
						7	shoots	20.1	
						14	pods with seed	0.29	
						14	shoots	16.5	
F – France 2000 (Masaï)	WG	0.500	0.17	300	3	0	pl. w/o root	18.4	2000/1014876 (A0033 AN1)
						3	pods with seed	0.58	
						3	shoots	< 0.05	
						7	pods with seed	0.53	
						7	shoots	21.5	
						14	pods with seed	0.31	
						14	shoots	15.4	
F – France 2000 (Booster)	WG	0.500	0.17	300	3	0	pl. w/o root	13.9	(A0033 TL2)
						3	pods with seed	0.71	
						3	shoots	30.3	
						7	pods with seed	0.95	
						7	shoots	22.6	
						15	pods with seed	0.65	
						15	shoots	19.9	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
F – France 2000 (Pissos)	WG	0.500	0.17	300	3	0 3 3 6 6 13 13	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	10.6 0.74 8.71 <u>0.62</u> 7.73 0.29 2.72	(A0033 SA1)
BEAN, (indoor)									
E – Spain 1999 (Primel)	WG	0.500	0.17	300	3	0 2 2 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	78.3 3.10 51.8 <u>0.69</u> 30.3 0.06 18.5	2000/1014847 (AC/11/99)
E – Spain 1999 (Primel)	WG	0.500	0.17	300	3	0 2 2 8 8 15 15	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	40.1 2.63 27.9 <u>0.29</u> 36.3 0.06 17.5	(AC/12/99)
E – Spain 1999 (Festival RZ)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	64.0 0.49 38.1 <u>0.28</u> 44.0 0.14 38.8	(AC/13/99)
E – Spain 1999 (Emerite)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	114.2 0.56 57.4 <u>0.28</u> 104.0 0.10 29.0	(AC/23/99)
E – Spain 2000 (Primel)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	34.6 3.80 83.3 1.29 71.8 <u>1.65</u> 121.3	2000/1014849 (AC/11/00)
E – Spain 2000 (Primel)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	40.9 1.46 54.3 <u>1.67</u> 76.5 1.13 104.0	(AC/12/00)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
E – Spain 2000 (Elda)	WG	0.500	0.17	300	3	0 3 3 8 8 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	50.5 0.95 26.5 0.06 14.1 < 0.05 15.1	(AC/13/00)
E – Spain 2000 (Judia Dulce)	WG	0.500	0.17	300	3	0 3 3 7 7 14 14	pl. w/o root pods with seed shoots pods with seed shoots pods with seed shoots	26.0 0.96 110.2 0.61 91.9 0.46 92.6	(AC/14/00)

Table 35. Results of residue trials with foliar treatment of boscalid conducted in peas (Haughey and Abdel-Baky, 2002, 2001/5003246).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
PEA, succulent, shelled									
USA, 2001 *PA, EPA region 1* (Wando)	WG	0.57	0.17	340	2	7	shelled pea	≤ 0.05	2001/5003246 (2001252)
NC, EPA region 2 (Green arrow)		0.56	0.20	280	2	7	shelled pea	0.06	(2001253)
GA, EPA region 2 (Progress No. 9) *MN, EPA region 5* (Knight)		0.57 0.56	0.57 0.33	100 170	2 2	7 7	shelled pea shelled pea	0.24 0.15	(2001254) (2001256)
MN, EPA region 5 (Top pod)		0.56	0.29	190	2	7	shelled pea	0.07	(2001257)
WI, EPA region 5 (Lazor)		0.57	0.30	190	2	8	shelled pea	0.37	(2001258)
WA, EPA region 11 (Case load)		0.56	0.29	190	2	7	shelled pea	≤ 0.05	(2001260)
QC, EPA region 5B (XP 353)		0.57	0.24	240	2	7	shelled pea	0.19	(2001338)
PEA, succulent, edible-podded									
USA, 2001 *MN, EPA region 5* (Casiadia)	WG	0.57	0.36	160	2	6	pods	1.39	2001/5003246 (2001255)
WA, EPA region 11 (Sugar snap)		0.56	0.29	190	2	7	pods	0.64	(2001259)
OR, EPA region 11 (SP704-3-8)		0.56	0.29	190	2	7	pods	0.97	(2001261)

1) average values used for estimation of MRL.

Table 36. Results of residue trials with foliar treatment of boscalid conducted in soybean (immature seed) (Leonard, 2003, 2002/5004272).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2002 *GA, EPA region 2* (NK RR S73-Z5)	WG	0.56	0.18	270-370	2	5 14	immature seed forage	< 0.05 4.31	2002/5004272 (2002191)
VA, EPA region 2 (NK S53Q7 7B-1001)	WG	0.58	0.19	310		5 14	immature seed forage	0.06 4.48	(2002192)
AR, EPA region 4 (AG4403)	WG	0.56	0.27	210		5 14	immature seed forage	1.18 16.0	(2002193)
AR, EPA region 4 (AG5603)	WG	0.56	0.20	280		5 14	immature seed forage	0.05 2.98	(2002194)
WI, EPA region 5 (BR2099RR)	WG	0.56	0.23	240		5 14	immature seed forage	0.08 1.62	(2002195)
MN, EPA region 5 (BR2099RR)	WG	0.56	0.23	240		6 14	immature seed forage	0.20 6.59	(2002196)
IA, EPA region 5 (SG 2531RR)	WG	0.57	0.22	260		5 14	immature seed forage	< 0.05 5.32	(2002197)
IA, EPA region 5 (SG 2533RR)	WG	0.57	0.22	260		5 14	immature seed forage	< 0.05 1.18	(2002198)
NE, EPA region 5 (Asgrow A2553)	WG	0.56	0.29	190		5 14	immature seed forage	< 0.05 6.67	(2002199)
NE, EPA region 5 (Asgrow 2703)	WG	0.56	0.29	190		5 13	immature seed forage	0.09 7.94	(2002200)
ND, EPA region 5 (Mycogen 5007)	WG	0.56	0.20	280		5 14	immature seed forage	< 0.05 5.43	(2002201)
ND, EPA region 5 (Mycogen 5007)	WG	0.56	0.20	280		5 14	immature seed forage	< 0.05 8.70	(2002202)
ND, EPA region 5 (Cropland RT0583)	WG	0.56	0.23	240		5 14	immature seed forage	< 0.05 4.73	(2002203)
SD, EPA region 5 (Cropland RT0583)	WG	0.56	0.23	240		5 14	immature seed forage	< 0.05 8.25	(2002204)
IL, EPA region 5 (B-T 441 CR)	WG	0.56	0.24	210-260		5 14	immature seed forage	< 0.05 3.05	(2002205)
IL, EPA region 5 (Asgrow AG3302)	WG	0.56	0.20	250-320		5 14	immature seed forage	< 0.05 3.63	(2002206)
QC, EPA region 5B (DKB07-51)	WG	0.55	0.21	260		5 14	immature seed forage	< 0.05 4.62	(2002216)

1) mean values used for estimation of MRL.

Table 37. Results of residue trials with foliar treatment of boscalid conducted in snap bean and lima bean (succulent shelled) (Haughey and Abdel-Baky, 2001, 2001/5000905).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
BEAN, snap									
USA, 2000 *PA, EPA region 1* (Bush Bean Roma II)	WG	0.57	0.20	280	2	7	snap bean	0.28	2001/5000905 (2000187)
GA, EPA region 2 (Bush Bean Roma II)		0.56	0.19	260	2	7	snap bean	0.97	(2000188)
FL, EPA region 3 (Rhapsody)		0.57	0.22	260	2	7	snap bean	0.72	(2000189)
MN, EPA region 5 (Top Crop)		0.56	0.33	170	2	7	snap bean	0.54	(2000190)
WI, EPA region 5 (Bush Blue Lake 274 Green Bean)		0.56	0.29	190	2	0 3 7 10 14	snap bean	0.29 0.22 0.13 0.06 < 0.05	(2000191)
CA, EPA region 10 (Seville)		0.56	0.20	280	2	7	snap bean	0.42	(2000192)
ID, EPA region 11 (Tendergreen)		0.56	0.18	310	2	7	snap bean	0.36	(2000193)
NS, EPA region 1A (Provider)		0.56	0.19	290	2	7	snap bean	0.41	(2000194)
QC, EPA region 5B (Goldmine)		0.58	0.2	290	2	7	snap bean	0.52	(2000195)
QC, EPA region 5B (Goldmine)		0.57	0.20	280	2	7	snap bean	0.46	(2000196)
LIMA BEAN									
USA, 2000 *NC, EPA region 2* (Early Thorogreen)	WG	0.57	0.20	280	2	7	lima bean	0.47	2001/5000905 (2000197)
GA, EPA region 2 (Henderson)		0.56	0.21	270	2	7	lima bean	0.07	(2000198)
GA, EPA region 2 (Nenagreen)		0.56	0.29	190	2	7	lima bean	0.07	(2000199)
WI, EPA region 5 (Henderson)						0 3 7 10 14		0.10 0.08 0.07 0.08 0.07	(2000200)
CA, EPA region 10 (Henderson)		0.56	0.20	280	2	7	lima bean	0.08	(2000201)
CA, EPA region 10 (Fordhood 242)		0.57	0.20	280	2	7	lima bean	< 0.05	(2000202)
ID, EPA region 11 (Henderson)		0.58	0.20	290	2	7	lima bean	< 0.05	(2000203)

1) average values used for estimation of MRL.

Table 38. Results of residue trials with foliar treatment of boscalid conducted in bean (Haughey and Abdel-Baky, 2001, 2001/5000905).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
ADZUKI BEAN									
Japan, 2002 Hokkaido (Kitanootome)	WG	0.75	0.050	1500	3	7 14 21	dry bean	0.13 0.07 0.06	na
Japan, 2002 Yamagata (benidainagon)	WG	0.75	0.050	1500	3	7 14 21	dry bean	0.14 0.08 0.06	na
COMMON BEAN									
Japan, 2002 Hokkaido (Taishokintoki)	WG	0.75	0.050	1500	3	7 14 21	dry bean	0.03 0.10 0.18	na
Japan, 2002 Gifu (Nagauzura)	WG	0.75	0.050	1500	3	7 14 21	dry bean	0.32 0.55 0.63	na
Japan, 2002 Niigata (Kintoki)	WG	0.75	0.050	1500	2	21 28 35 45	dry bean	0.34 0.30 0.17 0.06	na
Japan, 2002 Gifu (Nagauzura)	WG	0.75	0.050	1500	2	21 28 35 45	dry bean	0.44 0.45 0.29 0.10	na
BEAN, dry									
USA, 2000 *ND, EPA region 5* (Pinto Topaz)	WG	0.57	0.30	190	2	21	dry bean	< 0.05	2001/5000905 (2000177)
ND, EPA region 5 (Maverick)		0.56	0.29	190	2	21	dry bean	< 0.05	(2000178)
MN, EPA region 5 (Pinto Topaz)		0.56	0.33	170	2	21	dry bean	0.06	(2000179)
WI, EPA region 5 (Dark red Kidney 126)		0.56	0.29	190	2	0 7 14 21 28	dry bean	< 0.05 0.07 0.08 < 0.05 0.09	(2000180)
ND, EPA region 7 (Maverick)		0.56	0.40	140	2	21	dry bean	< 0.05	(2000181)
TX, EPA region 8 (Taylor Horticulture improved)		0.57	0.30	190	2	21	dry bean	0.12	(2000182)
CO, EPA region 9 (Pinto Bill Z)		0.56	0.56	100	2	21	dry bean	1.92	(2000183)
CA, EPA region 10 (Linden Light Red kidneys)		0.56	0.25	220	2	21	dry bean	0.37	(2000184)
ID, EPA region 11 (Pinto Apache)		0.56	0.20	280	2	21	dry bean	< 0.05	(2000185)
AB, EPA region 7[a] (Pinto Othello)		0.55	0.28	200	2	21	dry bean	0.14	(2000186)

na: not available.

1) average values used for estimation of MRL.

Table 39. Results of residue trials with foliar treatment of boscalid conducted in peas (Haughey and Abdel-Baky, 2002, 2001/5003246).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
PEA, dry, shelled									
USA, 2001 *ND, EPA region 5* (Athos)	WG	0.58	0.61	95	2	20	dry pea	0.05	2001/5003246 (2001244)
AB, EPA region 14 (Admiral)		0.56	0.51	110	2	21	dry pea	0.31	(2001248)
AB, EPA region 14 (Croma)		0.56	0.51	110	2	21	dry pea	0.17	(2001249)
SK, EPA region 14 (Delta)		0.56	0.51	110	2	21	dry pea	0.39	(2001250)
SK, EPA region 14 (Delta)		0.56	0.51	110	2	20	dry pea	0.23	(2001251)
WA, EPA region 11 (Lazer)		0.56	0.29	190	2	21	dry pea	0.16	(2001334)
WA, EPA region 11 (Estancia)		0.56	0.29	190	2	21	dry pea	0.12	(2001335)
OR, EPA region 11 (Paso)		0.57	0.30	190	2	22	dry pea	0.11	(2001336)
ID, EPA region 11 (09690470)		0.56	0.20	280	2	21	dry pea	0.09	(2001337)

1) average values used for estimation of MRL.

Table 40. Results of residue trials with foliar treatment of boscalid conducted in soybean (Lwonard, 2003, 2002/5004272).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2002 *GA, EPA region 2* (NK RR S73-Z5)	WG	0.57	0.16	350	2	21 21	mature seed hay	< 0.05 1.29	2002/5004272 (2002191)
VA, EPA region 2 (NK S53Q7 7B-1001)	WG	0.57	0.18	310	2	22 22	mature seed hay	< 0.05 2.28	(2002192)
AR, EPA region 4 (AG4403)	WG	0.56	0.27	210	2	20 20	mature seed hay	< 0.05 4.55	(2002193)
AR, EPA region 4 (AG5603)	WG	0.56	0.20	280	2	22 22	mature seed hay	< 0.05 2.12	(2002194)
WI, EPA region 5 (BR2099RR)	WG	0.56	0.23	240	2	21 21	mature seed hay	< 0.05 1.76	(2002195)
MN, EPA region 5 (BR2099RR)	WG	0.56	0.23	240	2	22 22	mature seed hay	< 0.05 2.78	(2002196)
IA, EPA region 5 (SG 2531RR)	WG	0.57	0.22	260	2	21 21	mature seed hay	< 0.05 4.79	(2002197)
IA, EPA region 5 (SG 2533RR)	WG	0.57	0.24	240	2	21 21	mature seed hay	< 0.05 1.99	(2002198)
NE, EPA region 5 (Asgrow A2553)	WG	0.56	0.29	190	2	21 21	mature seed hay	< 0.05 21.3	(2002199)
NE, EPA region 5 (Asgrow 2703)	WG	0.56	0.29	190	2	21 21	mature seed hay	< 0.05 1.38	(2002200)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
ND, EPA region 5 (Mycogen 5007)	WG	0.56	0.19	290	2	21 21	mature seed hay	< 0.05 6.73	(2002201)
ND, EPA region 5 (Mycogen 5007)	WG	0.56	0.20	280	2	21 21	mature seed hay	< 0.05 7.08	(2002202)
ND, EPA region 5 (Cropland RT0583)	WG	0.56	0.23	240	2	21 21	mature seed hay	< 0.05 7.78	(2002203)
SD, EPA region 5 (Cropland RT0583)	WG	0.56	0.23	240	2	21 21	mature seed hay	< 0.05 11.3	(2002204)
IL, EPA region 5 (B-T 441 CR)	WG	0.56	0.20	260-300	2	20 20	mature seed hay	< 0.05 5.33	(2002205)
IL, EPA region 5 (Asgrow AG3302)	WG	0.56	0.22	200-310	2	21 21	mature seed hay	< 0.05 7.30	(2002206)
QC, EPA region 5B (DKB07-51)	WG	0.54	0.19	280	2	21 21	mature seed hay	< 0.05 3.57	(2002216)

1) average values used for estimation of MRL.

Table 41. Results of residue trials with foliar treatment of boscalid conducted in carrot (Versoi and Abdel-Baky, 2000, 2000/5208).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999 *FL, EPA region 3* (Choctaw)	WG	0.19	0.069	240-310	6	0	root w/o top	0.19	2000/5208 (99180)
MN, EPA region 5 (Dundee)	WG	0.38	0.22	170	3	0	root w/o top	0.18	(99181)
TX, EPA region 6 (Mercury)	WG	0.19	0.090	210	6	0	root w/o top	0.12	(99182)
CA, EPA region 10 (Danvers Half Long)	WG	0.38	0.14	280	3	0	root w/o top	< 0.05	(99183)
CA, EPA region 10 (Danvers Half Long)	WG	0.38	0.14	280	3	0	root w/o top	0.06	(99184)
CA, EPA region 10 (Nance)	WG	0.38	0.14	280	3	0 5 9 15 20	root w/o top	0.17 0.13 0.15 0.16 0.15	(99185)
CA, EPA region 10 (Nantes)	WG	0.38	0.14	380	3	0	root w/o top	0.34	(99186)
ID, EPA region 11 (Danvers Half Long)	WG	0.38	0.29	130	3	0	root w/o top	0.28	(99187)

1) average values used for estimation of MRL.

Table 42. Results of residue trials with foliar treatment of boscalid conducted in radish (Haughey and Abdel-Baky, 2001, 2001/50002572).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999 *FL, EPA region 3* (Early Scarlet Globe)	WG	0.38	0.14	280	3	0	root	0.40	2001/50002572
								0.38	
						3		0.34	
								0.25	
						7		0.14	
								0.18	
						10		0.12	
								0.12	
						0	top	48.32	
								61.44	
						3		31.08	
								43.92	
						7		4.39	
								4.19	
						10		1.37	
								1.11	
FL, EPA region 3 (Red Silk)	WG	0.38	0.13	280-320	3	0	root	0.20	
								0.15	
						3		0.20	
								0.21	
						7		0.12	
								0.12	
						10		0.09	
								0.07	
						0	top	33.04	
								26.2	
						3		6.46	
								5.79	
						7		4.08	
								4.87	
						10		2.33	
								2.99	
MN, EPA region 5 (white Icicle)	WG	0.38	0.22	170	3	0	root	0.06	
								0.08	
						3		0.15	
								0.12	
						7		< 0.05	
								< 0.05	
						10		< 0.05	
								< 0.05	
						0	top	20.68	
								20.72	
						3		8.51	
								7.11	
						7		7.69	
								6.41	
						10		2.81	
								4.47	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
CA, EPA region 10 (white Icicle)	WG	0.38	0.12	280-330	3	0	root	0.10	
								0.12	
						3		0.11	
								0.06	
						7		0.08	
								0.09	
						10		< 0.05	
								0.06	
						0	top	25.76	
								24.44	
						3		13.84	
								11.18	
						7		10.46	
								10.54	
						10		7.78	
								6.56	
PA, EPA region 3 (Altaglobe)	WG	0.38	0.11	350	3	0	root	0.61	
								0.60	
						3		0.43	
								0.46	
						7		0.20	
								0.23	
						10		0.15	
								0.16	
						0	top	24.48	
								22.80	
						3		2.72	
								2.65	
						7		1.67	
								1.65	
						10		0.80	
								0.92	

1) average values used for estimation of MRL.

Table 43. Results of residue trials with foliar treatment of boscalid conducted in potato (Wofford and Abdel-Baky, 2001, 2001/5000879).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
POTATO									
USA, 2000 *PA, EPA region 1* (Andover)	WG	0.50	0.15	340	2	30	tuber	≤ 0.05	2001/5000879 (2000161)
NJ, EPA region 1 (Reba)		0.50	0.17	290	2	10	tuber	< 0.05	(2000162)
						20		< 0.05	
						30		≤ 0.05	
						40		< 0.05	
						50		< 0.05	
NC, EPA region 2 (Atlantic)		0.50	0.18	280	2	30	tuber	≤ 0.05	(2000163)
FL, EPA region 3 (Red Pontiac)		0.50	0.18	280	2	30	tuber	≤ 0.05	(2000164)
ND, EPA region 5 (Atlantic)		0.50	0.26	190	2	30	tuber	≤ 0.05	(2000165)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
ND, EPA region 5 (Atlantic)		0.50	0.26	190	2	30	tuber	< 0.05	(2000166)
WI, EPA region 5 (Russet Burbank)		0.50	0.26	190	2	30	tuber	< 0.05	(2000167)
MN, EPA region 5 (Atlantic Newleaf)		0.50	0.26	190	2	30	tuber	< 0.05	(2000168)
CO, EPA region 9 (Norkotah)		0.50	0.21	240	2	30	tuber	< 0.05	(2000169)
CA, EPA region 10 (Russet)		0.50	0.18	280	2	10 20 30 40 50	tuber	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05	(2000170)
OR, EPA region 11 (Russet Norkotah)		0.50	0.29	170	2	30	tuber	< 0.05	(2000171)
WA, EPA region 11 (Newleaf Plus)		0.50	0.26	190	2	30	tuber	< 0.05	(2000309)
ID, EPA region 11 (Russet Burbank)		0.50	0.18	280	2	30	tuber	< 0.05	(2000173)
ID, EPA region 11 (Russet Burbank)		0.50	0.18	280	2	30	tuber	< 0.05	(2000174)
WA, EPA region 11 (Newleaf Plus)		0.50	0.26	190	2	30	tuber	< 0.05	(2000175)
OR, EPA region 11 (Norchip)		0.50	0.25	200	2	30	tuber	< 0.05	(2000176)
WA, EPA region 11 (Newleaf Plus)		2.50	0.26	190	2	30	tuber	< 0.05	(2000175)

1) average values used for estimation of MRL.

Table 44. Results of residue trials with foliar treatment of boscalid conducted in cereal grain (Raunft *et al*., 2003, 2003/1009783; Johnston, 2005, 2005/5000151).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
BARLEY									
UK; 2003 *Oxfordshire* (Cellar)	SC	0.35	0.12	300	2	0 20 20 48 48	plant w/o root ear culm grain straw	12 1.1 5.3 0.03 13	2003/1009783 (OAT/15/03)
Netherlands, 2003 *Limburg* (Theresa)	SC	0.35	0.12	300	2	0 7 7 61 61	plant w/o root ear culm grain straw	6.4 0.94 2.3 < 0.01 0.51	(AGR/13/03)
Germany; 2005 *Brandenburg* (Annabell)	SC	0.35	0.12	300	2	0 19 19 54 54	plant w/o root ear culm grain straw	5.2 0.07 4.1 < 0.01 2.5	2005/5000151 (ACK/07/05)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Denmark; 2005	SC	0.35	0.12	300	2	0	plant w/o root	6.2	(ALB/10/05)
Fuenen						11	ear	3.3	
(Chess)						11	culm	4.2	
						63	grain	0.19	
						63	straw	5.8	
France ; 2005	SC	0.35	0.12	300	2	0	plant w/o root	18	(FBD/28/05)
Rhône-Alpes						13	ear	0.57	
(Orelie)						19	culm	8.4	
						61	grain	0.02	
						61	straw	27	
France ; 2005	SC	0.35	0.12	300	2	0	plant w/o root	7.7	(FTL/17/05)
Midi-Pyrénées						7	ear	7.5	
(Prestige)						7	culm	10	
						44	grain	0.12	
						44	straw	14	
WHEAT									
Germany; 2003	SC	0.35	0.12	300	2	0	plant w/o root	12	2003/1009783
Brandenburg						13	ear	0.31	(ACK/08/03)
(Colfiorito)						13	culm	13	
						52	grain	0.01	
						52	straw	15	
France ; 2003	SC	0.35	0.12	300	2	0	plant w/o root	9.4	(FBM/11/03)
Pays de la Loire						16	ear	0.51	
(Isengrain)						16	culm	3.9	
						64	grain	< 0.01	
						64	straw	3.1	
France ; 2003	SC	0.35	0.12	300	2	0	plant w/o root	6.6	(FTL/09/03)
Midi-Pyrénées						8	ear	6.8	
(Courtot)						8	culm	7.8	
						50	grain	0.06	
						50	straw	7.9	
Belgium; 2005	SC	0.35	0.12	300	2	0	plant w/o root	7.2	2005/5000151
Limburg						22	ear	< 0.05	(AGR/18/05)
(Cadenza)						22	culm	4.7	
						56	grain	0.01	
						56	straw	3.0	
France ; 2005	SC	0.35	0.12	300	2	0	plant w/o root	8.1	(FBD/28/05)
Rhône-Alpes						14	ear	0.19	
(Karur)						14	culm	3.7	
						54	grain	0.03	
						54	straw	5.3	
France; 2005	SC	0.35	0.12	300	2	0	plant w/o root	6.3	(FBM/10/05)
Pays de la Loire						23	ear	0.25	
(Royssac)						23	culm	4.5	
						64	grain	0.06	
						64	straw	7.9	
France ; 2005	SC	0.35	0.12	300	2	0	plant w/o root	6.1	(FTL/18/05)
Midi-Pyrénées						9	ear	4.0	
(Estenia)						9	culm	5.0	
						50	grain	0.27	
						50	straw	11	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
UK ; 2005 *Oxfordshire* (Xi 19)	SC	0.35	0.12	300	2	0 17 17 68 68	plant w/o root ear culm grain straw	4.1 < 0.05 2.7 0.01 5.8	(OAT/15/05)

Table 45. Results of residue trials with foliar treatment of boscalid conducted in almond (Haughey and Abdel-Baky, 2000, 2000/5226; Johnston, 2004, 2004/5000223).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999 *CA, EPA region 10* (Monterey)	WG	0.26	0.033	780-820	4	148	 nutmeat hull	 0.03 1.36	2000/5226 (99135) Treatment 2 Treatment 3
		0.26	0.013	1960-2150	4	148	nutmeat hull	0.02 2.35	
CA, EPA region 10 (Non-pareil)	WG	0.26	0.036	700-730	4	108	 nutmeat hull	 0.16 2.10	(99136) Treatment 2 Treatment 3
		0.26	0.014	1830-1890	4	108	nutmeat hull	0.20 1.62	
CA, EPA region 10 (Non-pareil)	WG	0.26	0.028	910-930	4	116	 nutmeat hull	 0.13 1.10	(99137) Treatment 2 Treatment 3
		0.26	0.011	2310-2360	4	116	nutmeat hull	0.16 1.36	
CA, EPA region 10 (Non-pareil)	WG	0.26	0.028	910-950	4	115	 nutmeat hull	 0.05 0.42	(99138) Treatment 2 Treatment 3
		0.26	0.011	2320-2400	4	115	nutmeat hull	0.04 0.82	
CA, EPA region 10 (Non-pareil)	WG	0.26	0.040	640-660	4	120 127 134 148 155	 nutmeat hull nutmeat hull nutmeat hull nutmeat hull nutmeat hull	 0.04 1.65 0.05 1.72 0.08 1.86 0.07 2.63 0.05 1.43	(99139) Treatment 2
		0.26	0.017	1480-1520	4	120 127 134 148 155	nutmeat hull nutmeat hull nutmeat hull nutmeat hull nutmeat hull	0.09 1.97 0.08 2.22 0.11 2.40 0.11 2.81 0.08 2.84	Treatment 3

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2003									2004/5000223
CA, EPA region 10	WG	0.26	0.045	580	4	25			(2003131)
(Monterey)							nutmeat	< 0.05	Treatment 2
							hull	11.3	
	WG	0.26	0.020	1350	4	25	nutmeat	< 0.05	Treatment 3
							hull	11.9	
CA, EPA region 10	WG	0.26	0.034	620-930	4	24			(2003132)
(Non-pareil)							nutmeat	< 0.05	Treatment 2
							hull	3.45	
	WG	0.26	0.017	1380-1660	4	24	nutmeat	< 0.05	Treatment 3
							hull	6.78	
CA, EPA region 10	WG	0.26	0.037	700	4	26			(2002133)
(Butte)							nutmeat	< 0.05	Treatment 2
							hull	2.21	
	WG	0.26	0.014	1880	4	26	nutmeat	< 0.05	Treatment 3
							hull	5.41	
CA, EPA region 10	WG	0.26	0.047	550	4	25			(2003134)
(Non-pareil)							nutmeat	< 0.05	Treatment 2
							hull	2.64	
	WG	0.26	0.014	1850	4	25	nutmeat	< 0.05	Treatment 3
							hull	3.42	
CA, EPA region 10	WG	0.26	0.035	750	4	25			(2003135)
(Carmel)							nutmeat	< 0.05	Treatment 2
							hull	3.30	
	WG	0.26	0.013	1950	4	25	nutmeat	< 0.05	Treatment 3
							hull	3.91	

Table 46. Results of residue trials with foliar treatment of boscalid conducted in pecan nut (Haughey and Abdel-Baky, 2001, 2000/5230).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID. (Trial No.)
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999	WG								2000/5230
									(99332)
GA, EPA region 2		0.26	0.037	680-730	4	14	nutmeat	< 0.05	Treatment 2
(Stewart)		0.26	0.016	1650	4	14	nutmeat	< 0.05	Treatment 3
GA, EPA region 2									(99333)
(Sumner)		0.26	0.033	750-830	4	14	nutmeat	< 0.05	Treatment 2
		0.26	0.014	1800	4	14	nutmeat	< 0.05	Treatment 3
MS, EPA region 4									(99334)
(Kiowa)		0.26	0.036	620-830	4	14	nutmeat	< 0.05	Treatment 2
		0.26	0.019	1350	4	14	nutmeat	< 0.05	Treatment 3
OK, EPA region 6									(99335)
(Seedling)		0.26	0.042	620	4	14	nutmeat	< 0.05	Treatment 2
		0.26	0.019	1380	4	14	nutmeat	< 0.05	Treatment 3
OK, EPA region 8									(99336)
(Natives)		0.26	0.036	720	4	14	nutmeat	< 0.05	Treatment 2
		0.26	0.016	1650	4	14	nutmeat	< 0.05	Treatment 3

Table 47. Results of residue trials with foliar treatment of boscalid conducted in pistachio (Haughey and Abdel-Baky, 2001, 2000/5229).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 1999	WG								2000/5229
CA, EPA region 10 (Kerman)		0.26 0.26	0.042 0.017	620 1520	4 4	14 14	nutmeat nutmeat	0.19 0.35	(99337) Treatment 2 Treatment 3
CA, EPA region 10 (Calagucci)		0.26 0.26	0.044 0.019	590 1380	4 4	14 14	nutmeat nutmeat	0.45 0.64	(99338) Treatment 2 Treatment 3
CA, EPA region 10 (Kerman)		0.26 0.26	0.027 0.014	950 1890	4 4	14 14	nutmeat nutmeat	≤ 0.05 ≤ 0.05	(99339) Treatment 2 Treatment 3

Table 48. Results of residue trials with foliar treatment of boscalid conducted in canola (Versoi and Abdel-Baky, 2001, 2001/5000048).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2000 *ND, EPA region 7* (Quantum)	WG	0.43	0.24	180	2	0 10 21 30 40	seed	1.61 1.62 1.34 0.63 0.70 0.36 1.05 1.08 0.75 1.09	2001/5000048
ND, EPA region 7 (Hyola 401)	WG	0.45	0.24	190	2	21	seed	0.70 0.88	
ND, EPA region 7 (Quantum)	WG	1.35	0.64	190	2	21	seed	0.58	
ID, EPA region 11 (Phoenix)	WG	0.45	0.24	190	2	0 10 20 29 40	seed	1.23 1.34 0.43 0.45 0.45 0.55 0.46 0.45 0.22 0.17	
AB, EPA region 14 (LG 3235)	WG	0.45	0.45	100	2	22	seed	0.14 0.22	
AB, EPA region 14 (LG 3235)	WG	0.45	0.45	100	2	22	seed	0.20 0.19	
AB, EPA region 14 (Agassiz)	WG	0.45	0.39	115	2	22	seed	0.55 0.70	
AB, EPA region 14 (Agassiz)	WG	0.45	0.39	115	2	22	seed	3.42 2.99	
AB, EPA region 14 (LG 3235)	WG	0.45	0.23	200	2	21	seed	0.24 0.36	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
AB, EPA region 14 (LG 3235)	WG	0.45	0.23	200	2	20	seed	1.27 2.58	
SK, EPA region 14 (45A71)	WG	0.45	0.39	115	2	21	seed	0.78 1.23	
SK, EPA region 14 (46A76)	WG	0.45	0.39	115	2	20	seed	0.76 0.75	
MB, EPA region 14 (Canterra 1867RR)	WG	0.45	0.23	200	2	21	seed	1.74 0.85	
MB, EPA region 14 (Canterra 1867RR)	WG	1.35	0.68	200	2	21	seed	5.10	
MB, EPA region 14 (LG3235)	WG	0.45	0.23	200	2	21	seed	3.13 3.13	
MB, EPA region 14 (Quest)	WG	0.45	0.39	115	2	19	seed	0.19 0.44	
MB, EPA region 14 (Quest)	WG	1.36	1.18	115	2	20	seed	1.96	
MB, EPA region 14 (45A51)	WG	0.45	0.39	115	2	19	seed	0.30 0.34	
MN, EPA region 5 (Golden Ready)	WG	0.45	0.24	190	2	22	seed	0.91 0.92	
MN, EPA region 5 (Golden Ready)	WG	1.34	0.71	190	2	22	seed	2.15	

Table 49. Results of residue trials with foliar treatment of boscalid conducted in sunflower (Versoi and Abdel-Baky, 2002, 2001/5002552; Leonard, 2005, 2005/5000022).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2001 *ND, EPA region 5* (Cropland-CL-803)	WG	0.45	0.19	240	2	21	seed	0.09	2001/50002552 (2001284)
ND, EPA region 5 (Interstate Seed)	WG	0.45	0.24	190	2	21	seed	0.08	(2001285)
ND, EPA region 7 (Interstate Seed)	WG	0.45	0.24	190	2	21	seed	0.13	(2001286)
SD, EPA region 7 (Mycogen 8377)	WG	0.45	0.24	190	2	20	seed	0.23	(2001287)
SD, EPA region 7 (Mycogen 8388)	WG	0.45	0.24	190	2	20	seed	0.16	(2001288)
TX, EPA region 8 (Triumph 567DW)	WG	0.45	0.23	200	2	21	seed	0.16	(2001289)
MB, EPA region 14 (Ag Canada 6111)	WG	0.45	0.23	200	2	21	seed	0.45	(2001290)

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
USA, 2004 *IL, EPA region 5* (Mycogen 8N429CL)	WG	0.44	0.19	230	2	21	seed	< 0.05	2005/5000022 (2004152)

* Results of a confirmatory analysis on the same seed sample.

1) average values used for estimation of MRL.

Table 50. Results of residue trials with foliar treatment of boscalid conducted in peanut (Wofford and Abdel-Baky, 2001, 2001/5000870).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid[1)]	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
PEANUT									
USA, 2000 *NC, EPA region 2* (NCV-11)	WG	0.50	0.18	280	3	13	nutmeat hay	0.05 20.2	2001/5000870 (2000148)
SC, EPA region 2 (Georgia Green)	WG	0.50	0.28	180	3	14	nutmeat hay	< 0.05 24.2	(2000149)
SC, EPA region 2 (Georgia Green)	WG	0.50	0.28	180	3	14	nutmeat hay	< 0.05 29.3	(2000150)
GA, EPA region 2 (Georgia Green)	WG	0.50	0.18	280	3	7 14 21 28 35 7 14 21 28 35	nutmeat hay	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05 5.78 7.79 3.87 5.38 3.90	(2000151)
FL, EPA region 3 (Georgia Green)	WG	0.50	0.15	330	3	13	nutmeat hay	< 0.05 6.70	(2000152)
AL, EPA region 2 (Georgia Green)	WG	0.50	0.42	120	3	15	nutmeat hay	< 0.05 5.84	(2000153)
GA, EPA region 2 (Agra Teck 201)	WG	0.50	0.19	270	3	14	nutmeat hay	< 0.05 3.15	(2000154)
GA, EPA region 2 (Valencia)	WG	0.50	0.19	270	3	14	nutmeat hay	< 0.05 28.4	(2000155)
GA, EPA region 2 (Georgia Green)	WG	0.50	0.22	230	3	14	nutmeat hay	< 0.05 12.58	(2000156)
TX, EPA region 6 (Pronto)	WG	0.50	0.26	190	3	14	nutmeat hay	< 0.05 -	(2000157)
OK, EPA region 6 (Spanco)	WG	0.50	0.36	140	3	13	nutmeat hay	< 0.05 6.65	(2000158)
OK, EPA region 8	WG	0.50	0.36	140	3	13	nutmeat hay	< 0.05 9.01	(2000159)

* The confirmatory re-analyses of the same sample.

- Not available. Hay samples were not collected from this site in error.

1) average values used for estimation of MRL.

Table 51. Results of residue trials with foliar treatment of boscalid conducted in coffee (Dantas, 2001, 2001/1026859; Dantas, 2001, 2001/1026860; Dantas, 2001, 2001/1026861; Dantas, 2001, 2001/1026862).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Brazil, 2000	WG								2001/1026859
Sao Paolo		0.15	0.030	500	1	0	coffee bean	< 0.05	
(Catual vermelho						15		< 0.05	
e amarelo)						30		< 0.05	
						45		≤ 0.05	
						60		< 0.05	
Brazil, 2000	WG								2001/1026860
Sao Paolo		0.15	0.030	500	1	45	coffee bean	≤ 0.05	
(Catual)		0.30	0.060	500	1	45		0.06	
						45		0.08	
Brazil, 2000	WG								2001/1026861
Romaria, MG		0.15	0.030	500	1	45	coffee bean	≤ 0.05	
(Mundo Novo)		0.30	0.060	500	1	45		< 0.05	
Brazil, 2000	WG								2001/1026862
Araguari, MG		0.15	0.030	500	1	45	coffee bean	≤ 0.05	
(Catual amarelo)		0.30	0.060	500	1	45		< 0.05	

Table 52. Results of residue trials with foliar treatment of boscalid conducted in hops (Schneider, 2002, 2001/1015050; Schneider, 2002, 2001/1015052; Schulz, 2004, 2003/1001292).

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid kg ai/ha	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany	SE	0.500	0.019	2700	3	0	cone, green	2.66	2001/1015050
2000		to		to [a)]		13	cone, green	3.67	
Niederlauterbach		0.600		3200		20	cone, green	3.54	
(Perle)						26	cone, green	3.72	
						20	cone, dried	32.4	
						26	cone, dried	14.6	
Germany	SE	0.500	0.019	2700	3	0	cone, green	3.03	
2000, Wolnzach		to		to [a)]		13	cone, green	3.53	
(Hallertauer		0.600		3200		20	cone, green	2.53	
Magnum)						26	cone, green	1.07	
						20	cone, dried	16.6	
						26	cone, dried	14.4	
Germany		0.500	0.019	2700	3	0	cone, green	4.56	
2000	SE	to		to [a)]		13	cone, green	4.57	
Holzhof Gemeinde		0.600		3200		20	cone, green	3.62	
Au						26	cone, green	4.57	
(Perle)						20	cone, dried	16.5	
						26	cone, dried	14.9	
Germany	SE	0.500	0.019	2700	3	0	cone, green	12.2	
2000		to		to [a)]		13	cone, green	5.89	
Unterempfenbach		0.600		3200		20	cone, green	5.46	
(Perle)						26	cone, green	1.77	
						20	cone, dried	20.4	
						26	cone, dried	33.6	

CROP Country, Year *Location* (variety)	Application Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.	PHI days	Commodity	Residues, mg/kg boscalid kg ai/ha	Ref. Reg.DocID.
Germany 2001, Hallertau (Perle)	SE	0.420 to 0.500	0.018	2300 to 2700 [a)]	3	0	cone, green	5.55	2001/1015052
						14	cone, green	3.68	
						21	cone, green	6.22	
						28	cone, green	3.05	
						21	cone, dried	10.4	
						28	cone, dried	12.3	
Germany 2001 Niederlauterbach (Perle)	SE	0.420 to 0.500	0.018	2300 to 2700 [a)]	3	0	cone, green	3.10	
						14	cone, green	2.72	
						21	cone, green	3.17	
						28	cone, green	1.67	
						21	cone, dried	5.69	
						28	cone, dried	5.23	
Germany 2001 Unterempfenbach (Perle)	SE	0.420 to 0.500	0.018	2300 to 2700 [a)]	3	0	cone, green	10.3	
						14	cone, green	10.3	
						21	cone, green	7.07	
						28	cone, green	5.72	
						21	cone, dried	36.6	
						28	cone, dried	21.7	
Germany 2001, Wolnzach (Hallertauer Magnum)	SE	0.420 to 0.500	0.018	2300 to 2700 [a)]	3	0	cone, green	4.51	
						14	cone, green	2.30	
						21	cone, green	2.89	
						28	cone, green	1.97	
						21	cone, dried	9.67	
						28	cone, dried	6.46	
Germany 2003, Bayern (Hallertauer Magnum)	SE	1) 0.420 2+3) 0.500	0.018 0.019	2300 [b)] 2700 [c)]	3	0	cones	13.0	2003/1001292
						14	cones	3.91	
						21	cones	5.83	
						28	cones	8.04	
	WG	1) 0.428 2+3) 0.504	0.019 0.019	2300 [b)] 2700 [c)]	3	0	cones	5.78	
						14	cones	5.09	
						21	cones	6.09	
						28	cones	7.02	
Germany 2003, Bayern (Spalter Select)	SE	1) 0.420 2+3) 0.500	0.018 0.019	2300 [b)] 2700 [c)]	3	0	cones	13.6	2003/1001292
						14	cones	9.64	
						21	cones	9.91	
						28	cones	4.09	
	WG	1) 0.428 2+3) 0.504	0.019 0.019	2300 [b)] 2700 [c)]	3	0	cones	22.7	
						14	cones	18.4	
						21	cones	7.55	
						28	cones	10.5	
Germany 2003, Bayern (Hall Tradition)	SE	1) 0.420 2+3) 0.500	0.018 0.019	2300 [b)] 2700 [c)]	3	0	cones	48.2	
						14	cones	19.8	
						21	cones	9.63	
						28	cones	6.98	
	WG	1) 0.428 2+3) 0.504	0.019 0.019	2300 [b)] 2700 [c)]	3	0	cones	15.3	
						14	cones	12.4	
						21	cones	21.1	
						28	cones	6.48	

CROP Country, Year *Location* (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid kg ai/ha	Ref. Reg.DocID.
	Formulation	kg ai/ha	kg ai/hL	Water L/ha	No.				
Germany 2003, Bayern (Perle)	SE	1) 0.420 2+3) 0.500	0.018 0.019	2300 [b)] 2700 [c)]	3	0 14 21 28	cones cones cones cones	15.0 8.25 20.1 5.36	
	WG	1) 0.428 2+3) 0.504	0.019 0.019	2300 [b)] 2700 [c)]	3	0 14 21 28	cones cones cones cones	15.5 6.27 16.1 12.8	

* average of multiple analysis

a) corresponding to 0.019 kg as/hL

b) corresponding to 0.0183 kg as/hL

c) corresponding to 0.0185 kg as/hL

FATE OF RESIDUES IN STORAGE AND PROCESSING

In processing

The Meeting received information on the fate of boscalid residues during aqueous hydrolysis under conditions of pasteurisation, baking, brewing, boiling and sterilisation. Information was also provided on the fate of boscalid residues during the food processing of citrus, apples, plums, cherries, strawberries, grapes, white cabbage, gherkins, tomatoes, head lettuce, peas, soybeans, carrots, sugar beet, barley, winter wheat, corn, peanuts, sunflower, cotton seed, canola seed, mint and hops.

[^{14}C] boscalid, labelled in the diphenyl moiety, was dissolved in aqueous buffer solutions of different pHs (Scharf, 1998, 1998/10878). In order to simulate the process of pasteurisation, the test solutions were heated for 20 minutes at 90°C. For simulation of baking, brewing and boiling, the test substances were treated under reflux at 100°C for 60 minutes. For simulation of sterilisation, samples were treated at about 120°C in an autoclave for 20 minutes.

Boscalid was not degraded during the simulation of pasteurisation (pH 4, 90°C), baking, boiling, brewing (pH 5, 100°C) or during sterilisation (pH 6, 120°C) (Table 53).

Table 53. Recovery data after the simulation of processing (Scharf, 1998, 1998/10878).

Process	Test conditions	Diphenyl-label, % TAR* after test
Pasteurisation	pH 4, 90 °C	99.3
Baking, brewing and boiling	pH 5, 100 °C	100.2
Sterilisation	pH 6, 120 °C	99.1

* Total applied radioactivity

A study was performed testing boscalid in oranges, grapefruits and lemons in 2002 (Jordan, 2002, 2002/5002446). The trees were treated four times with boscalid at a rate of 0.34 kg ai/ha beginning 30 days before harvest with a spraying interval of 10 days. Citrus RAC samples were collected directly after the last application. They were separated into pulp and peel. All samples were analysed by method D9908 which led to an average recovery of 84 ± 9%. Residues found in orange fruit, separated into pulp and peel, showed significantly less residue in the pulp sample than in the whole fruit, thus confirming that the majority of the residue remains on the peel of the fruit (Table 54).

Table 54. Boscalid residues in citrus and processed fractions resulting from supervised trials in the USA (Jordan, 2002, 2002/5002446).

CITRUS country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Orange									
USA, 2001, FL (Valencia)	WG	1.34	0.095	1400-1410	4	0	fruit pulp peel	0.50, 0.68 0.10, 0.12 2.60, 3.97	2002/5002446
USA, 2001, FL (Navel)	WG	1.37	0.16	840-870	4	0	fruit pulp peel	0.18, 0.23 < 0.05, < 0.05 0.63, 0.69	
USA, 2001, FL (Hamlin)	WG	1.34	0.095	1400-1410	4	0	fruit pulp peel	0.54, 0.56 0.05, < 0.05 2.57, 2.05	
USA, 2001, FL (Hamlin)	WG	1.36	0.16	810-840	4	0	fruit pulp peel	1.43, 1.36 0.20, 0.10 6.26, 4.55	
USA, 2001, FL (Valencia, Swingle)	WG	1.34	0.087	1520-1550	4	0	fruit pulp peel	0.47, 0.64 0.07, 0.09 2.33, 2.79	
USA, 2001, FL (Pineapple)	WG	1.33	0.16	800-820	4	0	fruit pulp peel	0.68, 1.19 0.08, 0.09 2.18, 2.57	
USA, 2001, FL (Hamlin)	WG	1.36	0.071	1860-1950	4	0	fruit pulp peel	0.33, 0.33 < 0.05, < 0.05 0.70, 0.76	
USA, 2001, FL (Valencia)	WG	1.34	0.19	690-700	4	0	fruit pulp peel	0.71, 0.27 < 0.05, 0.06 1.72, 1.06	
USA, 2001, TX (Everhard Navel)	WG	1.36	0.058	2340-2380	4	0	fruit pulp peel	0.32, 0.24 < 0.05, < 0.05 0.68, 0.81	
USA, 2001, CA (Navel)	WG	1.34	0.040	3280-3390	4	0	fruit pulp peel	0.30, 0.24 < 0.05, < 0.05 0.98, 0.69	
USA, 2001, CA (Navel)	WG	1.34	0.18	720-730	4	0	fruit pulp peel	0.47, 0.31 0.05, 0.06 0.79, 0.85	
USA, 2001, CA (Navel)	WG	1.34	0.041	3240-3280	4	0	fruit pulp peel	0.35, 0.35 < 0.05, < 0.05 0.98, 1.16	
USA, 2001, CA (Cutter)	WG	1.33	0.18	720-730	4	0	fruit pulp peel	0.26, 0.24 < 0.05, < 0.05 0.42, 1.14	
Grapefruit									
USA, 2001, FL (Flame)	WG	1.34	0.080	1685	4	0	fruit	0.25, 0.27	2002/5002446
USA, 2001, FL (White Marsh)	WG	1.34	0.16	810-840	4	0	fruit	0.82, 0.85	
USA, 2001, FL (Flame)	WG	1.34	0.051	2540-2700	4	0	fruit	0.10, 0.06	
USA, 2001, TX (Rio Red)	WG	1.34	0. 19	690	4	0	fruit	0.12, 0.12	
USA, 2001, CA (Mello Gold)	WG	1.34	0.16	830-850	4	0	fruit	0.15, 0.14	
USA, 2001, CA (Oroblanco)	WG	1.34	0.064	2080-2120	4	0	fruit	0.15, 0.10	

CITRUS country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Lemon									
USA, 2001, FL (Bearss)	WG	1.38	0.17	780-850	4	0	fruit	0.68, 0.66	2002/5002446
USA, 2001, CA (Prior)	WG	1.34	0.060	2200-2260	4	0	fruit	0.74, 0.60	
USA, 2001, CA (Lisbon)	WG	1.34	0.19	690-720	4	0	fruit	1.51, 0.97	
USA, 2001, AZ (Lisbon)	WG	1.32	0.18	720-730	4	0	fruit	0.52, 0.59	
USA, 2001, AZ (Limonarie)	WG	1.32	0.072	1830-1850	4	0	fruit	0.94, 0.81	

Four field trials were conducted in different representative apple growing areas in Germany to determine the residue level of boscalid in apples and processed fractions during the 2001 growing season (Schulz, 2001, 2001/1015047). Boscalid was applied four times with an application rate of 200 g ai/ha (38, 30, 22 and 14 days before the commercial harvest) resulting in a maximum seasonal target rate of 800 g ai/ha boscalid, in order to determine the magnitude of the residues of active ingredients in or on RACs. For analysis, apples were collected immediately after the last application and about 14 days later. The fruit was processed to the following products: wash water, washed apples, fresh pomace, dried pomace, thick juice, apple juice, the remainder of the straining process and apple sauce (Table 55).

Table 55. Boscalid residues in apples and processed fractions resulting from supervised trials in Germany (Schulz, 2001, 2001/1015047).

APPLES country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2001, Lower Saxony (Jona-gold)	SE	0.6	0.060	1000	4	0	fruit wash water fresh pomace fresh juice	1.0 0.18 3.9 0.08	2001/1015047
						14	fruit wash water washed apples fresh pomace dried pomace thick juice fresh juice remainder of the straining process apple sauce	0.78 0.11 0.33 5.28 18.8 0.23 0.05 1.97 0.52	
Germany, 2001,	SE	0.6	0.060	1000	4	0	fruit	2.13	
Thruingia (Remo)						14	fruit wash water washed apples fresh pomace dried pomace thick juice fresh juice remainder of the straining process apple sauce	2.27 0.18 1.07 14.48 31.01 0.29 0.11 5.32 1.89	

APPLES country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2001, Schleswig-Holstein (Boskop)	SE	0.6	0.060	1000	4	0	fruit wash water fresh pomace fresh juice	1.24 0.12 2.58 0.10	
						14	fruit wash water washed apples fresh pomace dried pomace thick juice fresh juice remainder of the straining process apple sauce	0.58 0.07 0.58 4.79 11.62 0.13 < 0.05 1.36 0.58	
Germany, 2001, Hesse (Braeburn)	SE	0.6	0.060	1000	4	0	fruit	0.54	
						14	fruit wash water washed apples fresh pomace dried pomace thick juice fresh juice remainder of the straining process apple sauce	0.49 0.10 0.41 2.81 8.18 0.13 < 0.05 1.07 0.56	

At one location in California in 1999 (Wofford and Abdel-Baky, 2001, 2000/5275), plum trees were treated according to different application schemes: on one plot, the GAP rate of 0.26 kg ai/ha was applied 5 times. An exaggerated treatment was done on a second plot with 5 applications at a rate of 1.3 kg ai/ha were used. Treatments started 28 days before expected harvest with a 7 day interval between the sprays. Plum fruit samples were collected directly after the last application. The 5× treated plums were processed to prunes according to typical commercial practices. All samples were analysed by method D9908 which led to an average recovery of 87 ± 4% for plums and 84% for prunes (Table 56).

Table 56. Boscalid residues in plums and processed fractions resulting from supervised trials in USA(Wofford and Abdel-Baky, 2001, 2000/5275).

PLUMS country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 1999, CA (French Plume)	WG	0.77	0.034	2290	4	0	unwashed plum washed plums prunes	0.68 1.09 0.97 0.43 0.51 0.41	2000/5275

Plum trees at four locations in typical plum growing areas in Germany were treated five times with boscalid at the double of the recommended rate, i.e., 0.401 kg ai/ha, in order to investigate the residues in plums and the processed fractions plum puree and prune production (Schulz and Scharm, 2000, 2001/1000936). The double rate was used to increase the probability of finding measurable residues in the processed fractions. Plums for residue analysis were sampled manually immediately after the last application once the spray had dried. Plums were also taken 7 days after the last application. These samples were used for residue analysis and for processing. The plums were processed to the following products: wash water, washed plums, the remainder of the straining process, condensed water, plum-puree, dipping water, and prunes (Table 57).

Table 57. Boscalid residues in plums and processed fractions resulting from supervised trials in Germany (Schulz and Scharm, 2000, 2001/1000936).

PLUMS country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2000 Rhineland-Palatine ("Elena" auf Fereley)	WG	0.41	0.054	760	5	0	fruit	1.59	2001/1000936
						7	fruit washed plums wash water remainder of straining process condensed water puree dipping water prunes	1.55 0.96 0.42 2.54 < 0.05 2.97 0.36 4.88	
Germany, 2000 Hesse (Chrudimer)	WG	0.41	0.040	1030		0	fruit	0.52	
						7	fruit washed plums wash water remainder of straining process condensed water puree dipping water prunes	0.40 0.32 0.07 1.85 < 0.05 0.79 0.05 1.12	
Germany, 2000 Wiesbaden-Kloppenheim (Auerbacher)	WG	0.41	0.040	1029		0	fruit	0.46	
						7	fruit washed plums wash water remainder of straining process condensed water puree dipping water prunes	0.38 0.22 0.15 1.43 < 0.05 0.78 0.09 1.39	
Germany, 2000 Schleswig Holstein (Schraderhof)	WG	0.41	0.040	1013		0	fruit	0.33	
						7	fruit washed plums wash water remainder of straining process condensed water puree dipping water prunes	0.26 0.37 < 0.05 0.59 < 0.05 0.40 < 0.05 0.63	

Cherry trees at four locations in typical cherry growing areas in Germany were treated five times at double of the recommended rate (0.401 kg ai/ha) with boscalid in order to investigate the residues in cherries and in the processed fractions from washed and canned cherry production (Schulz, 2000, 2001/1000938). Samples were taken twice. The first sampling was performed immediately after last application once the spray had dried. The second sampling was performed 7 days after last application. These samples were used for residue analysis and for processing. The cherries were processed to the following products: de-stemmed cherries (RAC), wash water, stones (not used for residue analyses), washed cherries (= de-stemmed, washed and de-stoned cherries), canned cherries, fruit syrup and cherry juice (Table 58).

Table 58. Boscalid residues in cherries and processed fractions resulting from supervised trials in Germany (Schulz, 2000, 2001/1000938).

CHERRY country, year, location (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg boscalid	Ref
Germany, 2000 Rhineland-Palatine (Schattenmorellen)	WG	0.41	0.040	1032	5	0	fruit	1.56	2001/1000938
						7	fruit	1.04	
							washed cherries	0.27	
							wash water	0.95	
							canned cherries	0.42	
							fruit syrup	0.10	
							cherry juice	0.29	
Germany, 2000 Hesse (Haumüller)	WG	0.42	0.031	986-1540	5	0	fruit	0.67	
						7	fruit	0.29	
							washed cherries	0.35	
							wash water	0.16	
							canned cherries	0.25	
							fruit syrup	0.10	
							cherry juice	0.36	
Germany, 2000 Schleswig-Holstein (Schattenmorellen)	WG	0.40	0.040	1010	5	0	fruit	1.78	
						7	fruit	1.03	
							washed cherries	0.60	
							wash water	0.74	
							canned cherries	0.56	
							fruit syrup	0.09	
							cherry juice	0.45	
Germany, 2000 Schleswig-Holstein (Boseka)	WG	0.40	0.040	996	5	0	fruit	2.17	
						7	fruit	1.38	
							washed cherries	0.78	
							wash water	1.91	
							canned cherries	0.68	
							fruit syrup	0.18	
							cherry juice	0.43	

Strawberry plants at four locations, in typical strawberry growing areas in Germany, were treated four times with boscalid at double of the recommended rate (0.961 kg ai/ha) of boscalid in order to investigate the residues in strawberries and in the processed fractions canned strawberry and jam production (Scharm, 2000, 2001/1000937). Samples of strawberries for residue analysis were taken directly after the last application once the spray had dried. Strawberry samples were also collected 3 days after the last application. These samples were used for residue analysis and for processing. The strawberries were processed to the following products: washed strawberries, wash water, canned strawberries, fruit syrup, jam and distillate (Table 59).

Table 59. Boscalid residues in strawberries and processed fractions resulting from supervised trials in Germany (Scharm, 2000, 2001/1000937).

STRAWBERRY country, year, location (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues, mg/kg boscalid	Ref
Germany, 2000 Hesse (Symphony)	WG	0.95	0.097	984	4	0	fruit	0.80	2001/1000937
						3	fruit	0.79	
							washed fruit	0.20	
							washing water	0.23	
							canned fruit	0.27	
							fruit syrup	0.07	
							jam	0.11	
							distillate	< 0.05	

STRAWBERRY country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2000 Thuringia (Elsanta)	WG	1.01	0.096	1050	4	0	fruit	0.78	
						3	fruit washed fruit washing water canned fruit fruit syrup jam distillate	1.05 0.41 0.33 0.41 0.16 0.25 < 0.05	
Germany, 2000 Schleswig-Holstein (Korona)	WG	0.98	0.096	1019	4	0	fruit	1.17	
						3	fruit washed fruit washing water canned fruit fruit syrup jam distillate	1.59 0.29 0.19 0.40 0.11 0.18 < 0.05	
Germany, 2000 Schleswig-Holstein (Elsanta)	WG	0.98	0.096	1018	4	0	fruit	1.29	
						3	fruit washed fruit washing water canned fruit fruit syrup jam distillate	1.22 0.34 0.22 0.39 0.14 0.29 < 0.05	

A grape processing study was performed with boscalid in 2000 (Haughey and Abdel-Baky, 2001, 2001/5000065). At one location in California, grape vines were treated according to different application regimes: on one plot, the normal GAP was followed with 3 treatments at a rate of 0.41 kg ai/ha. An exaggerated treatment, 5× GAP rate, was done on a second plot with 3 applications at a rate of 2.08 kg ai/ha were used. Grape berry samples were collected at normal crop maturity, i.e., 14 days after the last application. The 5× treated grapes were processed to grape juice and raisins according to typical commercial practices (Table 60).

Table 60. Boscalid residues in grapes and processed juice and raisins resulting from supervised trials in USA (Haughey and Abdel-Baky, 2001, 2001/5000065).

GRAPE country, year, location (variety)	Application					PHI days	Commodity	Residues, mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2000,CA (Thompson Seedless)	WG	2.08	0.18	1174	3	14	fruit	4.65 4.95	2001/5000065
							raisins juice	11.35 11.86 1.84 2.15	

During the 1999 growing season four field trials, two each with red and white grape varieties, were conducted in different representative wine growing areas in Germany to determine the residue levels of boscalid in grapes and grape processing fractions (must, wine, pomace) (Meumann, 1999, 2000/1012412). Boscalid was applied 3 times 28 ± 2 days before normal harvest at application rates of about 0.64 kg ai/ha (average value). For the analysis grape samples were collected within 3 hours after the last application as well as 28 ± 2 days later. Fruit samples for processing of juice, wine and pomace were taken 28 ± 2 days after the last application (Table 61).

Table 61. Boscalid residues in grapes and processed fractions resulting from supervised trials in Germany (Meumann, 1999, 2000/1012412).

GRAPE country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Gremany, 1999 Baden-Wüttermberg (Spätburgunder)	WG	0.63	0.090	612-803	3	0	fruit	1.13	2000/1012412
						28	fruit	1.58	
							wet pomace	3.79	
							must, cold	0.51	
							must, after mash heating	0.14	
							wine, from must, cold	0.41	
							wine from must, after mash heating	0.13	
Gremany, 1999, Baden-Wüttermberg (Mürttemberg)	WG	0.64	0.090	610-810	3	0	fruit	1.49	
						28	fruit	1.40	
							wet pomace	2.73	
							must, cold	0.68	
							wine, from must, cold	0.66	
							must, after short time heating	0.67	
							wine from must, after short time heating	0.64	
Gremany, 1999, Rheinland Pfalz (Portugieser)	WG	0.63	0.089	598 832	3	0	fruit	0.56	
						28	fruit	0.50	
							wet pomace	1.30	
							must, cold	0.26	
							must, after mash heating	0.09	
							wine, from must, cold	0.18	
							wine from must, after mash heating	0.06	
Gremany, 1999, Rheinland Pfalz (Riesling)	WG	0.64	0.090	614-829	3	0	fruit	0.62	
						28	fruit	0.58	
							wet pomace	1.98	
							must, cold	0.23	
							wine, from must, cold	0.20	
							must, after short time heating	0.26	
							wine from must, after short time heating	0.21	

White cabbage plants at four locations in typical cabbage growing areas in Germany were treated with boscalid to investigate the residues in the raw commodity and in processed fractions such as cooked white cabbage and sauerkraut (Schulz and Scharm, 2000, 2001/1000943). The cabbage plants was treated four times, at a rate of 1.2 kg ai/ha. The treatment rate was three times that of the recommended rate in order to increase the probability of finding residues. Samples of cabbage heads for residue analysis were taken after the last application once the spray had dried. Cabbage heads were also taken 14 to 15 days after the last application. These samples were used for residue analysis and for processing. The white cabbages were processed to the following products: Outer leaves, inner leaves, inner and outer stalks, cooked white cabbage head, boiled water, sauerkraut, juice of sauerkraut and pasteurised juice of sauerkraut (Table 62).

Table 62. Boscalid residues in white cabbages and processed fractions resulting from supervised trials in Germany (Schulz and Scharm, 2000, 2001/1000943).

WHITE CABBAGE country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Gremany, 2000 Thuringia (Megadon)	WG	1.21	0.40	302	4	0	head	2.44	2001/1000943
						15	head	0.12	
							outer leaves	1.87	
							inner leaves	< 0.05	
							inner/out stalks	0.553	
							cooked cabbage	< 0.05	
							boiled water	< 0.05	
							sauerkraut juice	< 0.05	
							sauerkraut	< 0.05	
							sauerkraut juice (pasteurized)	< 0.05	
Gremany, 2000, Hesse (Transam)	WG	1.20	0.40	299	4	0	head	2.80	
						14	head	0.64	
							outer leaves	13.79	
							inner leaves	< 0.05	
							inner/out stalks	1.14	
							cooked cabbage	< 0.05	
							boiled water	< 0.05	
							sauerkraut juice	< 0.05	
							sauerkraut	0.14	
							sauerkraut juice (pasteurized)	< 0.05	
Gremany, 2000, Hesse (Transam)	WG	1.22	0.40	304	4	0	head	6.81	
						14	head	1.49	
							outer leaves	24.67	
							inner leaves	< 0.05	
							inner/out stalks	0.05	
							cooked cabbage	< 0.05	
							boiled water	< 0.05	
							sauerkraut juice	< 0.05	
							sauerkraut	0.13	
							sauerkraut juice (pasteurized)	< 0.05	
Gremany, 2000, Hesse (Transam)	WG	1.24	0.40	311	4	0	head	5.90	
						14	head	0.77	
							outer leaves	40.60	
							inner leaves	< 0.05	
							inner/out stalks	0.09	
							cooked cabbage	< 0.05	
							boiled water	< 0.05	
							sauerkraut juice	< 0.05	
							sauerkraut	0.08	
							sauerkraut juice (pasteurized)	< 0.05	

During the 2000 growing season four field trials were conducted in different representative areas for cucumber (gherkins) cultivation in Germany, to determine the residue level of boscalid in cucumbers and resulting processed fractions (Scharm, 2000, 2001/1000942). The cucumber plants were treated four times, each time with about 0.30 kg ai/ha of boscalid, approximately double the GAP rate. The applications were performed at about 24, 17, 10 and 3 days before the expected harvest. For analysis, cucumbers were taken immediately after the last application and 3 days following. The cucumbers were processed to washed and canned cucumbers (Table 63).

Table 63. Boscalid residues in cucumbers and processed fractions resulting from supervised trials in Germany (Scharm, 2000, 2001/1000942).

CUCUMBER country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Gremany, 2000 Thuringia (Melody)	SC	0.31	0.030	1041	4	0	gherkins	0.46	2001/1000942
						3	gherkins	0.16	
							gherkins[1)]	0.15	
							washed gherkins	0.11	
							wash water	0.09	
							canned gherkins	0.09	
							brine	< 0.05	
Gremany, 2000, Hesse (Pontomac)	SC	0.31	0.030	1039	4	0	gherkins	0.14	
						3	gherkins	< 0.05	
							gherkins[1)]	0.10	
							washed gherkins	0.05	
							wash water	< 0.05	
							canned gherkins	< 0.05	
							brine	< 0.05	
Gremany, 2000, Hesse (Musica)	SC	0.31	0.030	1035	4	0	gherkins	0.23	
						3	gherkins	0.11	
							gherkins[1)]	0.13	
							washed gherkins	0.06	
							wash water	< 0.05	
							canned gherkins	0.07	
							brine	< 0.05	
Gremany, 2000, Eich (Mauvin)	SC	0.31	0.030	1018	4	0	gherkins	0.16	
						3	gherkins	0.10	
							gherkins[1)]	0.22	
							washed gherkins	< 0.05	
							wash water	< 0.05	
							canned gherkins	0.05	
							brine	< 0.05	

1) for processing.

Tomato plants at four locations in California were treated with boscalid to determine the magnitude of the residues in processed tomato fractions. The tomato plants were treated twice, at a rate of 3 kg ai/ha, approximately five times the GAP rate (Haughey and Abdel-Baky, 2001, 2001/5000967). Whole tomato samples were collected 0 days after the last application. The tomato RAC samples from the control and 5× plots were harvested and processed according to simulated commercial practices into wet pomace, fresh canned juice, puree, paste, peeled tomatoes, canned tomatoes and peel (Table 64).

Table 64. Boscalid residues in tomatoes and processed fractions resulting from supervised trials in USA (Haughey and Abdel-Baky, 2001, 2001/5000967).

TOMATO country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2000, CA (UF6203)	WG	3.09	1.09	283	2	0	unwashed tomato RAC	1.52	2001/5000967
							wash water	0.20	
							washed tomatoes	0.21	
							wet pomace	1.42	
							canned juice	0.19	
							puree	0.36	
							tomato paste	0.80	
							peeled tomatoes	< 0.05	
							canned tomatoes	< 0.05	
							peel	0.43	

TOMATO country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2000, CA (3155)	WG	3.11	0.66	472	2	0	unwashed tomato RAC	0.71[1)]	
							wash water	0.14	
							washed tomatoes	0.67[1)]	
							wet pomace	1.54[1)]	
							canned juice	0.19	
							puree	0.52[1)]	
							tomato paste	1.59[1)]	
							peeled tomatoes	-	
							canned tomatoes	-	
							peel	-	
USA, 2000, CA (Hypeel 108)	WG	3.08	1.39	222	2	0	unwashed tomato RAC	0.96	
							wash water	0.34	
							washed tomatoes	0.16	
							wet pomace	0.82	
							canned juice	0.15	
							puree	0.23	
							tomato paste	0.79	
							peeled tomatoes	< 0.05	
							canned tomatoes	< 0.05	
							peel	0.34	
USA, 2000, CA (La Roma)	WG	3.08	0.82	374	2	0	unwashed tomato RAC	0.75	
							wash water	0.05	
							washed tomatoes	0.11	
							wet pomace	0.82	
							canned juice	0.07	
							puree	0.14	
							tomato paste	0.47	
							peeled tomatoes	< 0.05	
							canned tomatoes	0.09	
							peel	0.44	

1) average of duplicate or triplicate analyses of a single sample.

- not collected.

Four field trials were conducted in representative head lettuce growing areas of Germany and Spain to determine the residue levels of boscalid (Raunft *et al.*, 2000, 2001/1006128). The lettuce plants were treated twice at a rate of 0.801 kg ai/ha, double GAP rate. For analysis, plant material was sampled within 3 hours after the second application and 14 days later. At the second sampling, additional lettuce was collected which was processed immediately in the field (Table 65).

Table 65. Boscalid residues in head lettuce and processed fractions resulting from supervised trials in Germany and Spain (Raunft *et al.*, 2000, 2001/1006128).

HEAD LETTUCE country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 2000 Andalucía (Yerga)	WG	0.80	0.16	500	2	0	head	9.27	2001/1006128
						14	head	1.05	
							leaves (exterior)	1.95	
							leaves (exterior rinsed)	1.32	
							leaves (interior)	0.06	
							leaves (interior rinsed)	< 0.05	

HEAD LETTUCE country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Spain, 2000, Andalucía (Reina Verde)	WG	0.82	0.16	511	2	0	head	9.81	
						14	head leaves (exterior) leaves (exterior rinsed) leaves (interior) leaves (interior rinsed)	2.27 2.52 1.64 < 0.05 0.07	
Germany, 2000 Baden-Württemberg (Einstein)	WG	0.79	0.16	492	2	0	head	21.01	
						14	head leaves (exterior) leaves (exterior rinsed) leaves (interior) leaves (interior rinsed)	0.28 0.35 0.16 0.05 < 0.05	
Germany, 2000 Rheinland-Pfalz (Nadine)	WG	0.79	0.16	492	2	0	Head	26.33	
						14	head leaves (exterior) leaves (exterior rinsed) leaves (interior) leaves (interior rinsed)	0.07 0.09 0.06 < 0.05 < 0.05	

Four field trials were conducted in different pea cultivation areas in Germany to determine the residue levels of boscalid in peas and process fractions involved in canned pea production (Scharm, 2000, 2000/1014885). The peas were treated twice at a rate of 1.0 kg ai/, which is double the GAP rate. For analysis, shoots (whole plant without roots) were collected directly after the last application. In three trials, green seeds were sampled at 7–8 days after the last application and manually separated from the pods. In one trial, the seeds matured earlier than expected. These were harvested using a combine harvester at 7 days after the last application. All seed samples were used for residue analysis and processing. During the processing of peas, to produce canned peas, the following fractions were obtained: washed peas, wash water, cooked peas, boiled water, canned peas and vegetable stock (Table 66).

Table 66. Boscalid residues in peas and processed fractions resulting from supervised trials in Germany (Scharm, 2000, 2000/1014885).

PEA country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2000 Hesse (Stok)	WG	0.99	0.25	395	2	0	shoots	20.27	2000/1014885
						7	green seeds (RAC) washed peas wash water cooked peas boiled water canned peas vegetable stock	0.14 0.07 0.06 < 0.05 < 0.05 < 0.05 < 0.05	
Germany, 2000, Thuringia (Gloriosa)	WG	0.88	0.25	353	2	0	shoots	5.09	
						8	green seeds (RAC) washed peas wash water cooked peas boiled water canned peas vegetable stock	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05	

PEA country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2000, Thuringia (Remus)	WG	0.89	0.25	355	2	0	shoots	5.76	
						8	green seeds (RAC)	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	
Germany, 2000 Hesse (Nitouch)	WG	0.99	0.25	396	2	0	shoots	9.48	
						7	green seeds (RAC)	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	

A second processing study was conducted on peas in Germany and the Netherlands to determine the residue levels of boscalid in peas and process fractions involved in canned pea production (Schulz, 2003, 2004/1000750). The peas were treated twice, each time at a rate of 1.34 kg ai/ha, five times GAP rate. For analysis, whole plants, without roots, were collected directly after the last application. At 10 and 14 days after the last application respectively, seeds (RAC) were sampled. During the processing of peas to produce canned peas, the following fractions were obtained: washed peas, wash water, cooked peas, boiled water, canned peas and vegetable stock (Table 67).

Table 67. Boscalid residues in peas and processed fractions resulting from supervised trials in Germany and the Netherlands (Schulz, 2004, 2004/1000750).

PEA country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2003 Brandenburg (Feltham)	WG	1.34	0.34	400	2	0	whole plant	49.4	2004/1000750
						10	seeds	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	
Germany, 2003, Brandenburg (Samish)	WG	1.34	0.34	400	2	0	whole plant	70.5	
						13	seeds	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	
Netherlands, 2003, Limburg (Remus)	WG	1.34	0.34	400	2	0	whole plant	28.5	
						13	seeds	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	

PEA country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2003 Nordehein-Westfalen (Misty)	WG	1.34	0.34	400	WG	0	whole plant	22.1	
						14	seeds	< 0.05	
							washed peas	< 0.05	
							wash water	< 0.05	
							cooked peas	< 0.05	
							boiled water	< 0.05	
							canned peas	< 0.05	
							vegetable stock	< 0.05	

A processing study was performed testing boscalid in soybean in 2001 (Versoi and Malinsky, 2001, 2001/5002529). At one location in Nebraska, soybean plants were treated twice at a rate of 5.6 kg ai/ha of boscalid, 5 times the normal recommended rate. Treatments started about three weeks before expected harvest with a 7 day interval between sprays. Soybean seed samples were collected at normal crop maturity, which was about 14 days after the final application. The seed was processed to meal, hulls and refined oil simulating typical commercial practices (Table 68).

Table 68. Boscalid residues in soybean and processed fractions resulting from supervised trials in USA (Versoi and Malinsky, 2001, 2001/5002529).

SOYBEAN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001 Nebraska (?)	WG	1.91			2	13	seed RAC	0.31	2001/5002529
							hulls	0.54	
							meals	< 0.05	
							refined oil	0.13	

Carrot plants at four locations in typical growing areas in Germany were treated with boscalid to investigate the residues in raw carrots and in the processed fractions cooked carrot, canned carrot and carrot juice (Scharm, 2000, 2001/1000939). The carrot plants were treated three times, at a rate of 1.202 kg/ha of boscalid, which is three times the GAP rate. The applications were made at a 6 to 8 days interval, starting 42 days before the expected harvest. The last application was performed 28 days before expected harvest, i.e., at the GAP pre-harvest-interval. Samples were collected directly after the last application, once the spray had dried, and 28 days later. These samples were used for residue analysis and for processing. The carrots were processed into the following products: washed carrot, combined wash water, peeled carrot, carrot peel, cooked carrot, cooking liquid, carrot juice, pomace, canned carrot and vegetable stock (Table 69).

Table 69. Boscalid residues in carrots and processed fractions resulting from supervised trials in Germany (Scharm, 2001, 2001/1000939).

CARROT country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2000 Schleswig-Holstein (Primecut 59)	WG	1.21	0.30	402	3	0	plant with roots	19.95	2001/1000939
						28	plant with roots	1.11	
							washed carrot	0.30	
							wash water	0.12	
							topped/peeled	0.07	
							peel	0.75	
							cooked carrot	0.05	
							cooking liquid	< 0.05	
							juice	< 0.05	
							pomace	0.07	
							canned carrot	< 0.05	
							vegetable stock	< 0.05	
Germany, 2000, Rhineland-Palatinate (Majestro)	WG	1.19	0.30	397	3	0	plant with roots	9.57	
						28	plant with roots	0.35	
							washed carrot	0.15	
							wash water	0.07	
							topped/peeled	< 0.05	
							peel	0.46	
							cooked carrot	< 0.05	
							cooking liquid	< 0.05	
							juice	< 0.05	
							pomace	0.06	
							canned carrot	< 0.05	
							vegetable stock	< 0.05	
Germany, 2000, Rhineland-Palatinate (Majestro)	WG	1.22	0.30	405	3	0	plant with roots	7.90	
						28	plant with roots	0.48	
							washed carrot	0.19	
							wash water	0.09	
							topped/peeled	< 0.05	
							peel	0.72	
							cooked carrot	< 0.05	
							cooking liquid	< 0.05	
							juice	< 0.05	
							pomace	0.08	
							canned carrot	< 0.05	
							vegetable stock	< 0.05	
Germany, 2000, Rhineland-Palatinate (Majestro)	WG	1.18	0.30	393	3	0	plant with roots	5.29	
						28	plant with roots	0.39	
							washed carrot	0.14	
							wash water	0.15	
							topped/peeled	< 0.05	
							peel	0.58	
							cooked carrot	< 0.05	
							cooking liquid	< 0.05	
							juice	< 0.05	
							pomace	0.06	
							canned carrot	< 0.05	
							vegetable stock	< 0.05	

In 2001, a study was performed in the US and Canada testing boscalid on sugar beet (Haughey and Abdel-Baky, 2001, 2001/5003245). In addition to the residue trials (10 locations) which were done according to the recommended GAP (2 × 0.56 kg ai/ha of boscalid) one trial was performed in Texas using the 5× application rate (2 × 2.8 kg ai/ha) to increase the probability of finding residues. Applications were done 21 and 14 days before expected harvest. Sugar beet RAC samples (roots and tops) were collected 7 days after the last application. They were processed to dried pulp, molasses and refined sugar simulating typical commercial practices (Table 70).

Table 70. Boscalid residues in sugar beet and processed fractions resulting from supervised trials in USA and Canada (Haughey and Abdel-Baky, 2001, 2001/5003245).

SUGAR BEET country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, MI (ACH 1353)	WG	0.56	0.28	201	2	7	sugar beet, root	0.07 0.09	2001/5003245
							sugar beet tops	4.28 4.19	
						14	sugar beet, root	0.08 0.08	
							sugar beet tops	2.67 3.28	
						21	sugar beet, root	0.08 0.07	
							sugar beet tops	2.11 1.64	
USA, 2001, MN(Crystal 205)	WG	0.57	0.34	168	2	7	sugar beet, root	0.19 0.23	
							sugar beet tops	3.31 3.49	
						14	sugar beet, root	0.12 0.14	
							sugar beet tops	2.49 2.26	
						21	sugar beet, root	0.09 0.10	
							sugar beet tops	2.18 2.12	
						28	sugar beet, root	0.18 0.14	
							sugar beet tops	1.77 1.64	
USA, 2001, MN (HM Resist RR)	WG	0.56	0.30	187	2	7	sugar beet, root	0.08 < 0.05	
							sugar beet tops	3.15 3.08	
						14	sugar beet, root	< 0.05 0.05	
							sugar beet tops	2.64 2.68	
						21	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	2.69 2.64	
USA, 2001, ND (Chrystal 222)	WG	0.55	0.30	187	2	7	sugar beet, root	< 0.05 0.08	
							sugar beet tops	3.67 4.73	
						14	sugar beet, root	< 0.05 0.06	
							sugar beet tops	4.03 2.92	
						21	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	2.24 3.27	

SUGAR BEET country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, WI (66283 Medium)	WG	0.55	0.30	187	2	7	sugar beet, root	0.14 0.12	
						14	sugar beet, root	0.09 0.14	
							sugar beet tops	3.60 4.29	
						21	sugar beet, root	0.08 0.09	
							sugar beet tops	3.65 2.64	
USA, 2001, ND (Chrystal 196)	WG	0.55	0.23	243	2	7	sugar beet, root	0.07 < 0.05	
							sugar beet tops	15.15 21.30 11.40 19.60	
						14	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	14.61 21.50 13.86 19.80	
						21	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	15.51 15.90 19.83 26.90	
USA, 2001, TX (Ranger)	WG	0.55	0.30	187	2	7	sugar beet, root	0.06 < 0.05	
							sugar beet tops	8.00 7.24	
						14	sugar beet, root	< 0.05 0.05	
							sugar beet tops	3.68 6.24	
						21	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	6.69 4.70	
		2.8	1.50	187	2	7	sugar beet root RAC	0.34 0.17	
							dried pulp	0.50 0.60	
							molasses	0.46 0.40	
							refined sugar	0.07 < 0.05	
USA, 2001, CA (NB7R)	WG	0.57	0.23	253	2	7	sugar beet, root	0.07 0.05	
							sugar beet tops	2.52 2.08	
						14	sugar beet, root	0.07 0.10	
							sugar beet tops	1.62 1.04	
						21	sugar beet, root	0.06 < 0.05	
							sugar beet tops	1.04 0.90	

SUGAR BEET country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, WA (Canyon)	WG	0.56	0.30	187	2	7	sugar beet, root	0.08 0.08	
							sugar beet tops	6.24 7.72	
						14	sugar beet, root	0.11 0.10	
							sugar beet tops	3.78 3.34	
						21	sugar beet, root	0.12 0.08	
							sugar beet tops	3.98 2.82	
Canada, 2001, MB (Bergen)	WG	0.57	0.51	112	2	7	sugar beet, root	< 0.05 < 0.05	
							sugar beet tops	22.41 17.51	
						14	sugar beet, root	0.21 0.18	
							sugar beet tops	12.33 7.92	
						21	sugar beet, root	0.17 0.14	
							sugar beet tops	8.85 7.44	

Four field trials were conducted in different representative cereal growing areas in Germany to determine the residue level of boscalid in barley and processed products during the 2002 growing season (Schulz, 2002, 2003/1000946). The barley was treated twice at a rate of 1.05 kg ai/ha, which is three times the GAP rate. The applications were made at 6 to 8 day intervals, starting at 42 days before expected harvest. Samples of barley grain were collected 40 to 59 days after the last application and used for the processing procedures. The material was subjected to two different processes simulating industrial practice: in a milling process, the consumer product pot barley and the waste fractions pearling dust and offal were obtained. In a malting and brewing process, the involved fractions malt germs, offal, steeping water, brewing malt, spent grain, condensed water, trub (flocs), beer yeast, and beer were investigated (Table 71).

Table 71. Boscalid residues in barley and processed fractions resulting from supervised trials in Germany (Schulz, 2003, 2003/1000946).

BARLEY country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2002 Hesse (Scarlett)	SC	1.06	0.35	303	2	59	grain[1)]	1.98	2003/1000946
							grain[2)] offal pearling dust pot barley	1.93 21.87 11.38 0.71	

BARLEY country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
							grain[3]	1.87	
							offal	6.55	
							brewing malt	0.70	
							malt germ	0.99	
							steeping water	0.02	
							brewing malt	0.65	
							spent grain	0.54	
							trub (flocs)	0.89	
							condensed water	< 0.01	
							beer yeast	0.29	
							beer (cold)	0.02	
							beer (frozen)	0.02	
Germany, 2002 Hesse (Scarlett)	SC	1.02	0.35	293	2	40	grain[1]	2.05	
							grain[2]	2.61	
							offal	34.14	
							pearling dust	12.61	
							pot barley	0.75	
							grain[3]	2.02	
							offal	4.34	
							brewing malt	0.90	
							malt germ	1.80	
							steeping water	0.02	
							brewing malt	0.88	
							spent grain	0.80	
							trub (flocs)	0.90	
							condensed water	< 0.01	
							beer yeast	0.94	
							beer (cold)	0.03	
							beer (frozen)	0.03	
Germany, 2002 Rhineland-Palatinate (Scarlett)	SC	1.04	0.35	297	2	41	grain[1]	1.25	
							grain[2]	1.98	
							offal	26.69	
							pearling dust	12.55	
							pot barley	0.74	
							grain[3]	1.60	
							offal	5.00	
							brewing malt	0.93	
							malt germ	1.55	
							steeping water	0.02	
							brewing malt	0.79	
							spent grain	0.76	
							trub (flocs)	0.57	
							condensed water	< 0.01	
							beer yeast	0.46	
							beer (cold)	0.03	
							beer (frozen)	0.03	
Germany, 2002 Rhineland-Palatinate (Barke)	SC	1.04	0.35	298	2	50	grain[1]	1.31	
							grain[2]	1.25	
							offal	16.00	
							pearling dust	9.16	
							pot barley	0.28	

BARLEY country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
							grain[3)] offal brewing malt malt germ steeping water brewing malt spent grain trub (flocs) condensed water beer yeast beer (cold) beer (frozen)	1.26 5.47 0.65 1.35 0.01 0.51 0.43 0.88 < 0.01 0.24 0.02 0.02	

1) Transfer factor = residue in process fraction / residue in RAC

2) for residue analysis

3) starting material for pot barley production

4) starting material for malting/brewing process

Four field trials were conducted in different representative cereal growing areas in Germany to determine the residue level of boscalid in winter wheat and processed products (Renner, 2003, 2003/1000945). The wheat was treated twice at a rate of 1.05 kg/ha, which is three times the GAP rate. The applications were carried out at 42 days before expected harvest. Samples of wheat grain were collected 42 to 60 days after last application and used for the processing procedures. The material was subjected to processes simulating industrial practice producing wheat germ, coarse and total bran, flour (type 550) and wholemeal flour and bread (Table 72).

Table 72. Boscalid residues in winter wheat and processed fractions resulting from supervised trials in Germany (Renner, 2003, 2003/1000945).

WINTER WHEAT country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2002 Gülzow-Wilheminenhof (Trifter)	SC	1.06	0.35	306	2	53	grain middlings coarse bran total bran toppings flour type 550 wholemeal flour whole bread wheat germs	0.30 0.71 1.15 1.16 0.37 0.07 0.33 0.18 0.29	2003/1000945
Germany, 2002 Nienburg (Cardos)	SC	1.05	0.35	304	2	60	grain middlings coarse bran total bran toppings flour type 550 wholemeal flour whole bread wheat germs	0.36 1.32 1.85 1.96 0.81 0.08 0.41 0.27 0.57	
Germany, 2002 Litzendorf (Ludwig)	SC	1.05	0.34	305	2	42	grain middlings coarse bran total bran toppings flour type 550 wholemeal flour whole bread wheat germs	0.11 0.45 0.63 0.51 0.31 0.05 0.20 0.11 0.15	

WINTER WHEAT country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Germany, 2002 Motterwitz (Kanzler)	SC	1.07	0.35	309	2	44	grain middlings coarse bran total bran toppings flour type 550 wholemeal flour whole bread wheat germs	0.17 0.41 0.57 0.56 0.24 0.08 0.22 0.15 0.22	

A study was performed in the US and Canada testing boscalid in sweet and field corn in 2001 (Versoi and Malinsky, 2001, 2001/5002624). In addition to the residue trials done according to the recommended GAP (2 × 0.56 kg ai/ha of boscalid at 30 locations) one trial was performed in Nebraska using a 5× application rate (2 × 2.8 kg ai/ha) to increase the probability of finding residues in the processed fractions. Applications were done 42 and 35 days before expected harvest. Corn samples were collected 7 and 14 days after the last application and processed into refined oil, starch, meal, grits and flour simulating typical commercial practices (see Table 73).

Table 73. Boscalid residues in corn and processed fractions resulting from supervised trials in USA and Canada (Versoi and Malinsky, 2001, 2001/5002624).

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, PA (Doebler's 642XP)	WG	0.59	0.14	418	2	7 14 21 28 35	fresh corn	< 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05 < 0.05	2001/5002624
		0.58	0.14	412	2	0 7 14 20 27	forage	4.86 4.31 4.65 4.14 3.07 3.36 4.14 4.10 3.30 3.64	

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
		0.58	0.14	409	2	0	grain	< 0.05 < 0.05	
						7		< 0.05 < 0.05	
						14		< 0.05 < 0.05	
						20		< 0.05 < 0.05	
						28		< 0.05 < 0.05	
						0	stover	11.95 11.48	
						7		10.50 10.30	
						14		9.15 9.70	
						20		9.60 6.85	
						28		6.05 5.60	
USA, 2001, PA (Argent)	WG	0.57	0.14	407	2	7	fresh corn	< 0.05 < 0.05	
						7	forage	5.46 7.95	
						14		5.86 4.89	
		0.57	0.14	406	1	7	stover	21.55 19.92	
USA, 2001, NC (Pioneer)	WG	0.50	0.18	280	2	6	fresh corn	< 0.05 < 0.05	
		0.56	0.20	283	2	7	forage	4.43 3.42	
						14		3.21 3.76	
		0.56	0.20	281	2	7	grain	< 0.05 < 0.05	
						7	stover	18.30 19.45	
USA, 2001, FL (Golden Queen)	WG	0.57	0.20	286	2	6	fresh corn	< 0.05 < 0.05	
						6	forage	8.40 7.08	
						14		3.18 2.77	
		0.56	0.20	281	2	7	stover	12.15 7.95	
USA, 2001, IL (Burrus BX 789)	WG	0.56	0.45	125	2	7	fresh corn	< 0.05 < 0.05	
		0.56	0.45	124	2	7	forage	11.00 14.69	
						14		7.27 9.65	
		0.56	0.45	125	2	7	grain	< 0.05 < 0.05	
							stover	11.25 10.40	

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, IL (Hamel H1166)	WG	0.56	0.46	123	2	7	fresh corn	< 0.05 < 0.05	
		0.56	0.45	124	2	7 14	forage	5.09 4.01 3.91 3.91	
		0.56	0.45	125	2	7	grain stover	< 0.05 < 0.05 14.15 12.75	
USA, 2001, IL (Pioneer 33G26)	WG	0.56	0.29	194	2	7	fresh corn	< 0.05 < 0.05	
		0.56	0.29	194	2	7 14	forage	7.59 7.81 1.80 3.00	
		0.56	0.28	197	2	6	grain stover	< 0.05 < 0.05 8.75 10.60	
USA, 2001, IL (Pioneer 33G26)	WG	0.57	0.29	196	2	7	fresh corn	< 0.05 < 0.05	
		0.56	0.29	194	2	7 14	forage	7.16 7.43 5.11 5.95	
		0.56	0.28	198	2	7	grain stover	< 0.05 < 0.05 10.35 9.25	
USA, 2001, IA (Pioneer 34B23)	WG	0.56	0.44	126	2	6	fresh corn	< 0.05 < 0.05	
		0.56	0.42	133	2	7 13	forage	5.63 3.59 2.32 2.08	
		0.56	0.30	187	2	8	grain stover	< 0.05 < 0.05 3.29 3.18	
USA, 2001, IA (Pioneer 33A14)	WG	0.56	0.43	131	2	7 14	forage	3.13 5.10 4.26 4.15	
		0.56	0.34	166	2	7	grain stover	< 0.05 < 0.05 7.65 6.70	
USA, 2001, MO (Golden Harvest H-2552)	WG	0.57	0.43	133	2	7 13	forage	6.06 6.44 3.99 7.41	
		0.55	0.34	161	2	7	grain stover	< 0.05 < 0.05 10.25 6.95	

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, MN (DK C48-83)	WG	0.56	0.36	154	2	7	forage	3.73	
								3.52	
						14		2.63	
								2.64	
		0.56	0.32	175	2	7	grain	< 0.05	
								0.06	
							stover	9.55	
								8.05	
USA, 2001, MN (DK C48-83)	WG	0.56	0.34	166	2	7	forage	1.90	
								2.68	
						14		1.99	
								1.90	
		0.56	0.34	167	2	7	grain	< 0.05	
								< 0.05	
							stover	8.20	
								13.15	
USA, 2001, NE (Northrup King N58-D1)	WG	0.56	0.30	187	2	7	forage	7.18	
								7.15	
						13		3.27	
								3.39	
		0.56	0.30	187	2	7	grain	< 0.05	
								< 0.05	
							stover	11.60	
								10.15	
		2.81	1.50	187	2	7	grain	< 0.05	
								0.05	
							refined oil, wet milled	0.27	
								0.33	
							starch	< 0.05	
								< 0.05	
							meal	< 0.05	
								< 0.05	
							refined oil, drt milled	< 0.05	
								< 0.05	
							grits	< 0.05	
								< 0.05	
							flour	< 0.05	
								< 0.05	
USA, 2001, NE (Cargill M739)	WG	0.56	0.30	188	2	7	forage	6.24	
								6.69	
						13		2.53	
								3.43	
		0.56	0.30	189	2	7	grain	< 0.05	
								< 0.05	
							stover	30.10	
								24.35	
USA, 2001, WI (Pioneer 3753)	WG	0.56	0.30	188	2	7	forage	5.58	
								6.05	
						14		2.01	
								1.87	
		0.56	0.30	187	2	8	grain	< 0.05	
								< 0.05	
							stover	19.00	
								13.25	
USA, 2001, WI (Pioneer 3751)	WG	0.57	0.30	190	2	7	forage	5.58	
								5.85	
						14		2.09	
								2.72	

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
		0.57	0.30	189	2	8	grain	0.05 0.07	
							stover	17.75 24.55	
USA, 2001, WI (DeKalb DKC42-22 YG)	WG	0.57	0.30	192	2	7	forage	5.29 5.44	
						14		2.91 3.44	
		0.56	0.30	188	2	8	grain	0.07 0.08	
							stover	26.65 22.35	
USA, 2001, WI (Pioneer 38T27)	WG	0.55	0.30	186	2	7	forage	5.40 5.31	
						14		2.79 2.64	
		0.56	0.30	187	2	8	grain	0.07 0.06	
							stover	14.75 16.40	
USA, 2001, MN (DeKalb DKC39-47)	WG	0.56	0.30	188	2	0	forage	7.79 6.76	
						7		6.84 4.79	
						14		6.23 6.30	
						21		3.52 4.23	
						28		3.88 3.31	
		0.56	0.30	188	2	0	grain	< 0.05 < 0.05	
						7		< 0.05 < 0.05	
						14		< 0.05 < 0.05	
						21		< 0.05 < 0.05	
						28		< 0.05 < 0.05	
						0	stover	7.93 8.38	
						7		5.63 4.51	
						14		3.81 4.06	
						21		2.60 2.60	
						28		2.57 2.03	
USA, 2001, MN (DeKalb DKC39-47)	WG	0.56	0.30	188	2	7	forage	6.08 4.50	
						14		3.80 3.55	
		0.56	0.30	187	2	7	grain	< 0.05 < 0.05	
							stover	8.70 10.10	

CORN country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
Canada, 2001 Quebec (DK 44-22 bt)	WG	0.54	0.24	228	2	7	fresh corn	na < 0.05	
		0.54	0.24	226	2	8 14	forage	4.61 5.32 1.62 3.29	
		0.56	0.24	235	2	7	grain stover	< 0.05 < 0.05 11.25 11.60	
Canada, 2001 Quebec (DK 44-22 bt)	WG	0.56	0.24	233	2	8	fresh corn	< 0.05 < 0.05	
		0.57	0.24	237	2	8 14	forage	3.34 2.87 2.76 1.89	
		0.54	0.24	224	2	7	grain stover	< 0.05 < 0.05 10.90 13.10	
Canada, 2001 Quebec (DKC 44-41)	WG	0.55	0.24	230	2	7 14	forage	5.44 3.70 3.51 5.55	
		0.55	0.24	232	2	7	grain stover	< 0.05 < 0.05 7.73 6.40	
Canada, 2001 Quebec (DKC 359 RR)	WG	0.56	0.24	233	2	7 14	forage	3.54 3.89 2.88 2.25	
		0.58	0.24	244	2	6	grain stover	< 0.05 < 0.05 15.45 15.80	
USA, 2001, OK	WG	0.56	0.46	123	2	6	fresh corn	< 0.05 < 0.05	
(NK 4242 BT)		0.52	0.42	124	2	6 13	forage	3.54 3.03 3.04 1.97	
		0.55	0.43	128	2	7	grain stover	< 0.05 < 0.05 6.20 5.25	
Canada, 2001, Alberta (Sheeba)	WG	0.55	0.28	197	2	7 7 14	fresh corn forage	< 0.05 < 0.05 5.06 6.18 3.50 4.45	
		0.57	0.28	202	2	7	stover	9.75 10.85	
USA, 2001, CA (Silver Queen)	WG	0.56	0.20	282	2	8 8 14	fresh corn forage	< 0.05 < 0.05 8.06 9.24 3.38 9.45	

CORN country, year, location (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues mg/kg boscalid	Ref
		0.57	0.20	287	2	7	stover	37.10 21.45	
USA, 2001, OR (Kandy Kris)	WG	0.56	0.29	191	2	7 7 14	fresh corn forage	< 0.05 < 0.05 8.04 4.78 5.36 2.72	
		0.57	0.29	197	2	7	stover	8.30 9.95	
USA, 2001, OR (Honey & Pearls Super Sweet)	WG	0.57	0.20	284	2	7 7 14	fresh corn forage	< 0.05 < 0.05 3.08 2.52 1.01 1.12	
		0.57	0.20	287	2	7	stover	38.20 44.32	

A study was performed testing boscalid in peanuts in the USA (Wofford and Abdel-Baky, 2001, 2001/5000870). In addition to the residue trials done according to the recommended GAP (3 × 0.51 kg ai/ha of boscalid at 12 locations) one trial was performed in Georgia using a 3× application rate (3 × 1.5 kg ai/ha) to increase the probability of finding residues in the processed fractions. In this trial treatments began 42 days prior to harvest (digging) with retreatment intervals of 14 days and a PHI of 14 days. Peanuts were dug at normal crop maturity which was about 14 days after the last application. They were allowed to dry for 3–8 days and then separated in nutmeat and hay samples. Nutmeat was processed to meal, refined oil and bleached and treatment oil (Table 74).

Table 74. Boscalid residues in peanut and processed fractions resulting from supervised trials in USA (Wofford and Abdel-Baky, 2001, 2001/5000870).

PEANUT country, year, location (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues mg/kg boscalid	Ref
USA, 2000, NC (NCV-11)	WG	0.51	0.18	282	3	13	peanut nutmeat peanut hay	< 0.05 < 0.05 22.17 18.22	2001/5000870
USA, 2000, SC (Georgia Green)	WG	0.51	0.29	177	3	14	peanut nutmeat peanut hay	< 0.05 < 0.05 25.61 22.84	
USA, 2000, SC (Georgia Green)	WG	0.52	0.29	178	3	14	peanut nutmeat peanut hay	< 0.05 < 0.05 27.77 30.76	

PEANUT country, year, location (variety)	Application Form	kg ai/ha	kg ai/hL	water (L/ha)	no.	PHI days	Commodity	Residues mg/kg boscalid	Ref
USA, 2000, GA (Georgia Green)	WG	0.51	0.19	274	3	7	peanut nutmeat	< 0.05 < 0.05	
						14	peanut nutmeat	< 0.05 < 0.05	
						21	peanut nutmeat	< 0.05 < 0.05	
						28	peanut nutmeat	< 0.05 < 0.05	
						35	peanut nutmeat	< 0.05 < 0.05	
						7	peanut hay	5.67 5.89	
						14	peanut hay	8.78 6.79	
						21	peanut hay	3.46 4.28	
						28	peanut hay	3.91 6.84	
						35	peanut hay	3.17 4.62	
		1.53	0.56	275	3	14	peanut nutmeat RAC	< 0.05 < 0.05	
							meal	0.30 0.47	
							refined oil	0.33 0.59	
							bleached and deodorized oil	0.24 0.45	
USA, 2000, FL (Georgia Green)	WG	0.50	0.15	331	3	13	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	6.23 7.17	
USA, 2000, AL (Georgia Green)	WG	0.51	0.41	125	3	15	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	5.43 6.25	
USA, 2000, GA (Agra Teck 201)	WG	0.50	0.41	122	3	14	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	3.68 2.61	
USA, 2000, GA (Valencia)	WG	0.51	0.19	273	3	14	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	28.08 28.79	
USA, 2000, GA (Georgia Green)	WG	0.51	0.23	225	3	14	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	10.11 15.04	
USA, 2000, TX (Pronto)	WG	0.47	0.27	172	3	14	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	na na	
USA, 2000, OK (Spanco)	WG	0.50	0.38	132	3	13	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	7.21 6.08	
USA, 2000, OK (Spanco)	WG	0.50	0.38	133	3	13	peanut nutmeat	< 0.05 < 0.05	
							peanut hay	6.68 11.33	

na: not available

A study was performed testing boscalid in sunflower in 2001 in USA and Canada (Versoi and Abdel-Baky, 2001, 2001/5002552). In addition to the trials conducted for residue analysis after use according to normal GAP, one trial was done to obtain processed products. Sunflowers were treated twice at a rate of 2.25 kg ai/ha of boscalid (5×GAP rate) beginning 28 days prior to harvest with a retreatment interval of 7 days and a PHI of 21 days. Sunflowers were harvested at normal crop maturity, about 21 days after the last application and were later processed according to simulated commercial procedures into meal and refined oil (Table 75).

Table 75. Boscalid residues in sunflower and processed fractions resulting from supervised trials in USA and Canada (Versoi and Abdel-Baky, 2001, 2001/5002552).

SUNFLOWER country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, ND (Cropland CL-803)	WG	0.45	0.19	233	2	21	sunflower seed RAC	< 0.05 0.13	2001/5002552
USA, 2001, ND (Interstate Seed)	WG	0.45	0.24	188	2	21	sunflower seed RAC	< 0.05 0.11	
USA, 2001, ND (Interstate Seed)	WG	0.45	0.24	187	2	21	sunflower seed RAC	0.15 0.10	
USA, 2001, SD (Mycogen 8377)	WG	0.44	0.24	186	2	20	sunflower seed RAC	0.23 0.22	
USA, 2001, SD (Mycogen 8388)	WG	0.44	0.24	185	2	20	sunflower seed RAC	0.17 0.14	
USA, 2001, TX (Triumph 567DW)	WG	0.44	0.096	460	2	21	sunflower seed RAC	0.24 0.07	
		2.19	0.48	456	2	21	sunflower seed RAC sunflower, meal sunflower, refined oil	4.95 2.40 0.09 0.08 0.08 0.06	
Canada, 2001, Manitoba (Ag Canada 6111)	WG	0.45	0.41	111	2	21	sunflower seed RAC	0.35 0.54	

In 2004, a processing study was performed testing boscalid in cotton in USA (Jordan and Jones, 2005, 2005/5000013). Boscalid was applied twice at a rate of 2.24 kg ai/ha of boscalid as an in-furrow application. Cotton seed samples were harvested at normal maturity which was 30 days after the last application. Cotton seed was processed to produce meal, hulls, crude and refined oil (Table 76).

Table 76. Boscalid residues in cotton seed and processed fractions resulting from supervised trials in USA (Jordan and Jones, 2005, 2005/5000013).

COTTON country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2004, AR (ST4793RR)	WG	2.24	1.84	122	2	30	undelinted cotton seed (RAC) meal hulls oil, crude oil, refined	0.58 0.95 < 0.05 < 0.05 < 0.05 < 0.05 0.06 0.07 < 0.05 0.08	2001/5000013

A processing study was performed testing boscalid in canola in 2000 (Versoi and Abdel-Baky, 2001, 2001/5000049, 2001/5001064). At four locations in the US and Canada, canola was treated twice a rate of 1.34 kg ai/ha which is 3×GAP rate. Treatments were applied 26 and 21 days before expected harvest. Canola plant samples were collected at normal crop maturity which was about three weeks after the last application. The plants were allowed to dry for 0–7 days and subsequently processed to meal and refined oil, simulating typical commercial practices (Table 77).

Table 77. Boscalid residues in canola and processed fractions resulting from supervised trials in USA (Versoi and Abdel-Baky, 2001, 2001/5000049, 2001/5001064).

CANOLA country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2000, ND (Hyola 401)	WG	1.35	0.72	187	2	21	canola seed RAC cleaned seed expeller crude oil solvent extracted crude oil meal refined oil soapstock	0.72 0.56 1.11 1.05 0.37 1.39 0.50	2001/5000049 2001/5001064
Canada, 2000, Manitoba (Canterra 1867RR)	WG	1.33	0.67	198	2	21	canola seed RAC cleaned seed expeller crude oil solvent extracted crude oil meal refined oil soapstock	1.87 1.00 1.51 1.26 0.26 1.35 0.59	
Canada, 2000, Manitoba (Canterra 1867RR)	WG	1.36	1.21	112	2	20	canola seed RAC cleaned seed expeller crude oil solvent extracted crude oil meal refined oil soapstock	2.28 2.25 2.74 2.49 1.40 2.61 1.77	
USA, 2000, MN (Golden Ready)	WG	1.34	0.72	187	2	22	canola seed RAC cleaned seed expeller crude oil solvent extracted crude oil meal refined oil soapstock	1.76 1.57 2.00 1.99 1.11 2.53 1.13	

A study was performed testing boscalid in peppermint in 2001 (Versoi and Abdel-Baky, 2001, 2001/5002467). In addition to the trials conducted according to normal GAP, one trial was done to obtain processed products. Mint plants were treated four times at a rate of 2.25 kg ai/ha of boscalid (5×GAP rate) beginning 28 days prior to harvest with a retreatment interval of 7 days. Mint top samples were collected at 7 and about 14 days after the last application. After drying for two days, mint hay was processed, according to simulated commercial practices, into mint oil (Table 78).

Table 78. Boscalid residues in mint and processed fractions resulting from supervised trials in USA (Versoi and Abdel-Baky, 2001, 2001/5002467).

MINT country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha	kg ai/hL	water (L/ha)	no.				
USA, 2001, MI (Black Mitchum)	WG	0.45	0.20	220	4	7 14	mint tops	29.25 36.35 25.45 25.25	2001/5002467
USA, 2001, MI (Native)	WG	0.45	0.21	218	4	7 14	mint tops	16.05 15.40 12.30 14.45	
USA, 2001, OR (Native)	WG	0.45	0.24	189	4	7 14	mint tops	7.00 6.65 4.80 5.20	
		2.23	1.16	192	4	7	mint hay mint oil	81.00 103.40 0.08 0.08 0.19 0.18	
USA, 2001, ID (Native)	WG	0.45	0.16	283	4	7 14	mint tops	31.90 28.85 27.90 28.65	
USA, 2001, WA (Native)	WG	0.45	0.24	186	4	7 14	mint tops	13.20 13.35 13.55 14.45	

Four field trials were conducted in different representative hops growing areas in Germany and the Netherlands to determine the residue level of boscalid in hops and processed fractions (Schulz, 2001, 2001/1015048; 2001/1015049). Boscalid was applied three times in total, once at 0.18 kg ai/ha and twice at 0.24 kg ai/ha (35, 28 and 22–21 days before the commercial harvest in three trials and 21, 18, and 15 days in one trial) resulting in a maximum seasonal target rate of 0.66 kg ai/ha**,** in order to determine the magnitude of the residues of active ingredients in or on RACs. For analysis, hops were taken immediately after the last application and 15-22 days following. The processing included the following fractions: drip dried cones, condensed water, trub (flocs), beer yeast, beer (cooled) and beer (frozen) (Table 79).

Table 79. Boscalid residues in hops and processed fractions resulting from supervised trials in Germany and the Netherlands (Schulz, 2001, 2001/1015048; 2001/1015049).

HOPS country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha[1)]	kg ai/hL[1)]	water (L/ha) [1)]	no.				
Germany, 2001 Bavaria (Hersbrucker Spät)	WG	0.57	0.019	3049	3	15	cones green[2)] dried cones[3)] dried cones[4)] drip dried cones condensed water trub beer yeast beer cooled beer frozen	5.42 20.79 18.12 0.62 < 0.05 0.43 0.24 < 0.05 < 0.05	2001/1015048

HOPS country, year, location (variety)	Application					PHI days	Commodity	Residues mg/kg boscalid	Ref
	Form	kg ai/ha 1)	kg ai/hL 1)	water (L/ha) 1)	no.				
Germany, 2001 Bavaria (Hersbrucker Spät)	WG	0.57	0.019	3033	3	15	cones green 2) dried cones 3) dried cones 4) drip dried cones condensed water trub beer yeast beer cooled beer frozen	4.47 20.34 16.33 0.42 < 0.05 0.40 0.24 < 0.05 < 0.05	
Netherlands, 2001 Reijmerstok (Tauer)	WG	0.21	0.019	1115	3	0 21	cones green 2) cones green 2)) dried cones 3) dried cones 4) drip dried cones condensed water trub beer yeast beer cooled beer frozen	3.99 2.09 5.89 4.24 0.24 < 0.05 0.12 < 0.05 < 0.05 < 0.05	2001/1015049
Netherlands, 2001 Reijmerstok (Tauer)	WG	0.21	0.019	1124	3		cones green 2) cones green 2) dried cones 3) dried cones 4) drip dried cones condensed water trub beer yeast beer cooled beer frozen	4.18 1.62 6.77 3.86 0.25 < 0.05 0.12 0.06 < 0.05 < 0.05	

1) average values.

2) to be used for residue analysis.

3) to be used for processing to dried hops for residue analysis.

4) to be used for processing to dried hops for processing to beer.

Table 80. Summary of processing factors for boscalid residues. The factors are calculated from the data recorded in tables in this section.

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors. 1/	Median
Orange	Pulp	< 0.09, 0.09, < 0.11, 0.11, < 0.14, 0.14(2), < 0.15, < 0.18, < 0.19, 0.19, < 0.20, < 0.24	0.14
	Peel	2.10, 2.21, 2.54, 2.66, 2.84, 3.06, 3.09, 3.12, 3.22, 3.87, 4.20, 4.61, 5.57	3.09
Apples	Washed apples	0.42, 0.47, 0.84, 1.00	0.66
	Fresh pomace	2.08, 3.90, 5.73, 6.38, 6.77, 8.26	6.06
	Dried pomace	13.66, 16.69, 20.03, 24.10	18.36
	Thick juice	0.13, 0.22, 0.27, 0.29	0.25
	Fresh juice	0.05, 0.06, 0.08(2), < 0.09, < 0.10	0.08
	Apple Sauce	0.67, 0.83, 1.00, 1.14	0.92
Plums	Washed plum	0.58, 0.62, 0.79, 0.80, 1.42	0.79
	Puree	1.54, 1.92, 1.98, 2.05	1.95
	Prunes	0.52, 2.42, 2.80, 3.15, 3.66	2.80
Cherries	Washed cherries	0.26, 0.57, 0.58, 1.21	0.58
	Canned cherries	0.40, 0.49, 0.54, 0.86	0.52
	Fruit syrup	0.10, 0.10, 0.13, 0.34	0.12
	Cherry juice	0.28, 0.31, 0.44, 1.24	0.38

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors. 1/	Median
Strawberries	Washed strawberries	0.54, 0.67, 0.69, 0.71	0.68
	Canned strawberries	0.62, 0.69, 0.90, 1.00	0.80
	Fruit syrup	0.22, 0.23, 0.27, 0.28	0.25
	Jam	0.37, 0.42, 0.45, 0.46	0.44
	Distillate	< 0.08(2), < 0.13, < 0.17	< 0.11
Grapes	Raisins	2.42	2.42
	Wet pomace	1.95, 2.40, 2.60, 3.41	2.50
	Wine, from must, cold	0.09, 0.34, 0.36, 0.47	0.35
	Wine, from must after mash heating	0.12, 0.26, 0.36, 0.46	0.31
	Juice	0.42	0.42
White cabbage	Outer leaves	15.58, 16.56, 21.55, 52.72	19.06
	Inner leaves	< 0.03, < 0.06, < 0.08, < 0.42	< 0.07
	Inner and outer stalks	0.03, 0.11, 1.78, 4.61	0.95
	Cooked cabbage	< 0.03, < 0.06, < 0.08, < 0.42	< 0.07
	Sauerkraut	0.09, 0.10, 0.22, < 0.42	0.16
Gherkins	Washed gherkins	< 0.23, 0.46, 0.50, 0.73	0.48
	Canned gherkins	0.23, < 0.50, 0.54, 0.60	0.52
Tomatoes	Washed tomatoes	0.14, 0.15, 0.17, 0.94	0.16
	Wet pomace	0.85, 0.93, 1.09, 2.17	1.02
	Canned juice	0.09, 0.13, 0.16, 0.27	0.15
	Puree	0.19, 0.24(2), 0.73	0.24
	Tomato paste	0.53, 0.63, 0.82, 2.24	0.73
	Peeled tomatoes	< 0.03, < 0.05, < 0.07	< 0.05
	Canned tomatoes	< 0.03, < 0.05, 0.12	< 0.05
	Peel	0.28, 0.35, 0.59	0.35
Head lettuce	Leaves (exterior)	1.11, 1.25, 1.29, 1.86	1.27
	Leaves (exterior rinsed)	0.57, 0.72, 0.86, 1.26	0.79
	Leaves (interior)	< 0.02, 0.06, 0.18, < 0.71	0.12
	Leaves (interior rinsed)	0.03, < 0.05, < 0.18, < 0.71	< 0.12
Green peas	Washed peas	0.50, 1.0,1.0,1.0, 1.0, 1.0, 1.0, 1.0	1.0
	Cooked peas	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0	1.0
	Canned peas	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0	1.0
	Vegetable stock	1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0	1.0
Soybean	Hulls	1.74	1.74
	meals	< 0.16	< 0.16
	Refined oil	0.42	0.42
Carrots	Washed carrots	0.27, 0.36, 0.40, 0.43	0.38
	Topped/peeled	0.06, < 0.10, < 0.13, < 0.14	< 0.12
	Peel	0.68, 1.31, 1.49, 1.50	1.40
	Cooked carrot	0.05, < 0.10, < 0.13, < 0.14	< 0.12
	Juice	< 0.05, < 0.10, < 0.13, < 0.14	< 0.12
	Pomace	0.06, 0.15, 0.17(2)	0.16
	Canned carrot	< 0.05, < 0.10, < 0.13, < 0.14	< 0.12
	Vegetable stock	< 0.05, < 0.10, < 0.13, < 0.14	< 0.12
Sugar beets	Dried pulp	2.16	2.16
	Molasses	1.88	1.88
	Refined sugar	0.24	0.24
Barley	Offal	2.2, 3.1, 3.5, 4.3, 11.3, 12.8, 13.1, 13.5	7.8
	Pot barley	0.22, 0.29, 0.37(2)	0.33
	Brewing malt for residue analysis	0.37, 0.45, 0.52, 0.58	0.49
	Malt germ	0.53, 0.89, 0.97, 1.1	0.93
	Spent grain	0.29, 0.34, 0.40, 0.48	0.37
	Trub (flocs)	0.36, 0.45, 0.48, 0.70	0.47
	Beer yeast	0.16, 0.19, 0.29, 0.47	0.24
	Beer (cold)	0.01, 0.02, 0.02, 0.02	0.02
	Beer (frozen)	0.01, 0.02, 0.02, 0.02	0.02
Wheat	Middlings	2.37, 2.41, 3.67, 4.09	3.04
	Coarse bran	3.35, 3.83, 5.14, 5.73	4.49
	Total bran	3.29, 3.87, 4.64, 5.44	4.26
	Toppings	1.23, 1.41, 2.25, 2.82	1.83
	Flour type 550	0.22, 0.23, 0.45, 0.47	0.34
	Wholemeal flour	1.10, 1.14, 1.29, 1.82	1.22

Raw agricultural commodity (RAC)	Processed commodity	Calculated processing factors. 1/	Median
	Wholemeal bread Wheat germs	0.60, 0.75, 0.88, 1.00 0.97, 1.29, 1.36, 1.58	0.82 1.33
Corn	Refined oil, wet milled Starch Meal Refined oil, dried milled Grits Flour	6.0 1.0 1.0 1.0 1.0 1.0	6.0 1.0 1.0 1.0 1.0 1.0
Peanut	Meal Refined oil Bleached and deodorized oil	>7.8 >9.2 >6.9	-2/ - -
Sunflower	Meal Refined oil	0.02 0.02	0.02 0.02
Cotton	Meal Hulls Oil, crude Oil, refined	0.07 0.07 0.08 < 0.08(0.10)	0.07 0.07 0.08 < 0.08
Canola	Cleaned seed Expeller crude oil Solvent extracted crude oil Meal Refined oil Soapstock	0.53, 0.78, 0.89, 0.99 0.81, 1.14, 1.20, 1.54 0.67, 1.09, 1.13, 1.46 0.14, 0.51, 0.61, 0.63 0.72, 1.14, 1.44, 1.93 0.32, 0.64, 0.69, 0.78	0.84 1.17 1.11 0.56 1.29 0.67
Mint	Mint oil	0.002	0.002
Hops	Drip dried cones Trub (flocs) Beer yeast Beer (cooled) Beer (frozen)	0.02, 0.03, 0.04, 0.04 0.02, 0.02, 0.02, 0.02 < 0.01, < 0.01, 0.01, 0.01 < 0.002, < 0.002, < 0.01, < 0.01 < 0.002, < 0.002, < 0.01, < 0.01	0.035 0.02 0.01 < 0.006 < 0.006

1/ 'Less-than' (<) values are derived from cases where residues were not detected in the processed commodity. The 'less-than' processing factor is then calculated from the LOQ of the analyte in the processed commodity and the residue in the RAC.

2/ Residues of boscalid were not detected in peanut, so a processing factor was not calculated and estimates in processed products were not made.

RESIDUES IN ANIMAL COMMODITIES

Direct animal treatments

Boscalid is not used for direct animal treatments.

Farm animal feeding studies

Ruminants

The Meeting received a lactating dairy cow feeding study, which provided information on likely residues resulting in animal tissues and milk from residues in the animal diet.

Four Groups of lactating Holstein cows (animals weighing 510–735 kg initially) were dosed twice daily via transferring the contents of the appropriate vial onto the molasses sugar beet feed with boscalid at 1.5 (1×), 4.5 (3×) and 18 ppm (12×) in the dry-weight diet, for 28 consecutive days (Tilting, 2001, 2000/1017228) (Table 81). Milk was collected twice daily for analysis. Animals were sacrificed within 23 hours following the final dosing and tissue samples were taken, except for one cow of the 12× group which were sacrificed seven days after the final dose to determine residue levels post-dosing. Tissues collected for analysis were liver, kidney, fat and muscle. Animals consumed approximately 12.2–20.1 kg dry-weight feed each per day and produced at least 12.7 kg milk per animal per day (measured during dosing period). Samples were analysed by methods 471/0 and 476/0 (Tables 82, 83 and 84).

Table 81. Actual Dose Levels (Tilting, 2001, 2000/1017228).

Cow (Number)	Nominal dose mg/kg feed	Actual dose: mg/animal/day	Actual concentration: mg/kg-bw	Actual concentration:** mg/kg-feed
1068 (1)	0	0	0	0
3191 (2)	0	0	0	0
5337 (3)	0	0	0	0
Average group A	0	0	0	0
996 (4)	1.5	30	0.047	1.583
3541 (5)	1.5	30	0.058	2.058
5180 (6)	1.5	30	0.044	1.765
Average group B	1.5	30	0.050	1.802
3137 (7)	4.5	90	0.161	5.56
3253 (8)	4.5	90	0.130	7.15
3555 (9)	4.5	90	0.176	5.02
Average group C	4.5	90	0.156	5.91
1226 (10)	18	360	0.612	20.50
1938 (11)	18	360	0.611	19.18
5070* (12)	18	360	-	-
3048 (13)	18	360	0.507	20.61
3083 (14)	18	360	0.495	20.36
Average group D	18	360	0.556	20.16

* Animal withdrawn from study due to mastitis

** Based on average feed intake during dosing period

Table 82. Residues of boscalid and metabolite M510F01 in milk from lactating dairy cows dosed with boscalid at 1.5 (1×), 4.5 (3×) and 18 ppm (12×) in the dry-weight diet, for 28 consecutive days (Tilting, 2001, 2000/1017228). Reported values are means of 3 values for the 1.5 and 4.5 ppm groups and of 4 values in the 18 ppm group (Tilting, 2001, 2000/1017228).

Day	1.5 ppm group (1×)			4.5 ppm group (3×)			18 ppm group (12×)		
	milk	skim milk	cream	milk	skim milk	cream	milk	skim milk	cream
	boscalid + M510F01, mg/kg								
-3	< 0.02 < 0.02 < 0.02			< 0.02 < 0.02 < 0.02			< 0.02 < 0.02 < 0.02 < 0.02 < 0.02		
1	n.a.			< 0.02 < 0.02 < 0.02			0.02 0.02 < 0.02 0.02 < 0.02		
3	n.a.			< 0.02 < 0.02 0.02			0.027 0.041 0.039 0.023 0.047		
6	< 0.02 < 0.02 < 0.02			< 0.02 < 0.02 < 0.02			< 0.02 0.025 0.022 < 0.02 0.031		
9	< 0.02 < 0.02 < 0.02			< 0.02 < 0.02 < 0.02			0.030 0.045 0.036 < 0.02 0.045		

Day	1.5 ppm group (1×)			4.5 ppm group (3×)			18 ppm group (12×)		
	milk	skim milk	cream	milk	skim milk	cream	milk	skim milk	cream
12	< 0.02 < 0.02 < 0.02			< 0.02 < 0.02 < 0.02			0.025 0.032 0.032 0.023 0.032		
15	n.a.			< 0.02 0.021 < 0.02			0.034 0.042 0.051 0.026 0.042		
18	n.a.			< 0.02 < 0.02 0.023			0.096 0.055 0.021 0.036 0.055		
21	< 0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	0.033 0.055 0.035	0.02 < 0.02 < 0.02	< 0.02 < 0.02 < 0.02	0.123 0.125 0.110	0.038 0.043 0.031 0.040	0.02 < 0.02 < 0.02 < 0.02	0.38 0.38 0.25 0.35
24	n.a.			< 0.02 < 0.02 < 0.02			0.035 0.046 0.026 0.040		
28	< 0.02 < 0.02 < 0.02			< 0.02 0.02 < 0.02			0.039 0.043 0.028 0.046		
29	n.a.			< 0.02 < 0.02 < 0.02			n.a.		
32	n.a.			n.a.			< 0.02		
36	n.a.			n.a.			< 0.02		

n.a.: not analyzed.

Table 83. Residues of boscalid and metabolite M510F01 in tissues from lactating dairy cows dosed with boscalid at 1.5 (1×), 4.5 (3×) and 18 ppm (12×) in the dry-weight diet, for 28 consecutive days (Tilting, 2001, 2000/1017228). Reported values are means of 3 values for the 1.5 and 4.5 ppm groups and of 4 values in the 18 ppm group (Tilting, 2001, 2000/1017228).

Tissue	1.5 ppm group (1×)		4.5 ppm group (3×)		18 ppm group (12×)	
	individuals	mean	individuals	mean	individuals	mean
	boscalid + M510F01, mg/kg					
Muscle	< 0.05, < 0.05, < 0.05	< 0.05	< 0.05, < 0.05, < 0.05	< 0.05	< 0.05, < 0.05, 0.058	0.053
Fat	0.078, < 0.05, < 0.05	0.059	0.124, 0.109, 0.082	0.105	0.235, 0.292, 0.278	0.268
Liver	< 0.05, < 0.05, < 0.05	< 0.05	0.055, 0.51, 0.064	0.057	0.182, 0.170, 0.180	0.177
Kidney	< 0.05, < 0.05, < 0.05	< 0.05	0.071, 0.063, 0.088	0.074	0.318, 0.220, 0.169	0.236

Table 84. Residues of boscalid and metabolite M510F01 in milk and tissues from the depuration animal dosed with boscalid at 18 ppm (12×) in the dry-weight diet, for 28 consecutive days and then fed with control feed until slaughter on day 36 (Tilting, 2001, 2000/1017228).

Matrix	Study day	boscalid, mg/kg	M510F01, mg/kg
Whole milk	32	< 0.01	< 0.01
Whole milk	36	< 0.01	< 0.01
Muscle	36	< 0.025	< 0.025
Fat	36	< 0.025	< 0.025

Matrix	Study day	boscalid, mg/kg	M510F01, mg/kg
Liver	36	< 0.025	< 0.025
Kidney	36	< 0.025	< 0.025

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

No information was received on residues of boscalid in food in commerce or at consumption.

NATIONAL MAXIMUM RESIDUE LIMITS

Information was provided on national residue definitions for boscalid.

Australia (APVMA, 2006)
Commodities of plant origin: boscalid.

Commodities of animal origin: Sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl) nicotinamide including its conjugate, expressed as boscalid.

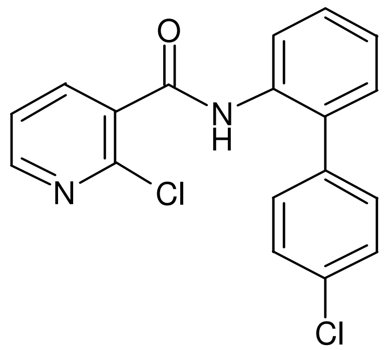
USA (USEPA, 2005)
Commodities of plant origin: boscalid.

Commodities of animal origin: Sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl) nicotinamide including its conjugate, expressed as boscalid.

APPRAISAL

Boscalid was considered for the first time by the present Meeting. It is an anilide fungicide that inhibits mitochondrial respiration, thereby inhibiting spore germination, germ tube elongation, mycelial growth, and sporulation of pathogenic fungi on the leaf surface, and is used against a broad spectrum of diseases in a wide range of crops.

2-Chloro-N-(4'-chlorobiphenyl-2-yl) nicotinamide



Animal metabolism

The Meeting received animal metabolism studies for boscalid in lactating goats and laying hens.

When lactating goats were orally dosed with [diphenyl-U-^{14}C] labelled boscalid for 5 consecutive days at about 65 mg/animal/day, equivalent to 35 ppm in the feed, most of the administered ^{14}C was excreted in the faeces (46% and 64%) and urine (23% and 44%). ^{14}C recovery amounted to 94–95% of the total radioactivity. Milk and tissues accounted for 0.06%–0.15% and 0.46%–0.66% of the administered ^{14}C respectively.

The major residues in muscle were boscalid, the hydroxylated compound M510F01 (2-chloro-N-(4'-chloro-5-hydroxybiphenyl- 2-yl)nicotinamide) and the glucuronic acid conjugate M510F02 (4'-chloro-6-{[(2-chloro-3-pyridinyl)carbonyl] amino}biphenyl-3- yl glycopyranosiduronic acid). These three metabolites were also detected in kidney. The main residues in fat were identified as boscalid and M510F01. The main residues in milk extracts were boscalid, M510F01, M510F02, and 4-chloro-2'-(acetylamino)-biphenyl (M510F53). Further characterisation of boscalid residues in liver demonstrated that the parent compound, M510F01, and M510F53 were the major residues. M510F53 originated from bound residues of parent compound during extraction with microwave treatment. Parent compound and its hydroxylated metabolite M510F01, including the conjugate M510F02 were the major residues in milk and each of the tissues.

When laying hens were orally dosed with [diphenyl-U-^{14}C] labelled boscalid for 10 consecutive days with 1.6 mg/bird/day, equivalent to 12.5 ppm in the feed, most of the administered ^{14}C was excreted in the excreta (97.7%). Recovery of ^{14}C amounted to 98.3% of the total radioactivity. Eggs and tissues accounted for 0.115% and 0.046% of the dose respectively.

The parent compound and its hydroxylated metabolite M510F01 were the main residues in eggs. Muscle had a very low residue levels and therefore was not further investigated. The main residue in fat was the parent compound.

Although there were similarities in the metabolic pathways in lactating goats and in poultry, there were also some differences, e.g., M510F53 in liver and milk was not identified in poultry tissues and eggs. The major residues in animal tissues are parent compound and M510F01 and M510F02. M510F54 was identified in chicken as a minor metabolite. M510F54 was found in liver and milk of lactating goats, but was not identified.

No metabolism study was performed in pigs since the metabolic patterns in rodents (rats) and ruminants (goats) did not differ significantly (See the toxicology report for more details of laboratory animal metabolism).

Plant metabolism

The Meeting received plant metabolism studies with boscalid on grapes, lettuce and beans.

In each crop tested, parent compound generally represented more than 90% of the total ^{14}C residue and showed almost no further metabolism to carbohydrates, proteins or other natural products.

When grapes plants were treated three times with ^{14}C-boscalid (diphenyl- and pyridine-label), parent compound represented more than 90% of the total ^{14}C residue in the samples taken at the maturity of grapes. An HPLC analysis of the methanol and the water extracts of all matrices showed that in grapes 92.7% of the TRR were represented by the unchanged parent compound for the diphenyl label and 92.2% for the pyridine label.

When lettuce plants were treated 3 times with ^{14}C-boscalid (diphenyl- and pyridine-label), parent compound represented more than 90% of the total ^{14}C residue in the samples taken 18 days after the last application.

When green beans were treated with 3 foliar applications, approximately 8−10 days apart, of ^{14}C-boscalid (diphenyl- and pyridine-label), the majority of the residue associated with the fruit sampled 14/15 and 53/51 (diphenyl/pyridine label) days after the final application was mainly boscalid, accounting for about 90% of the residue.

Environmental fate in soil

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

When [^{14}C]-boscalid labelled in the diphenyl ring or the pyridine ring was incubated with four different soils under aerobic conditions in the dark at different temperatures and soil moistures, it degraded slowly and identifiable metabolites were a minor part of the residue and almost degraded at the same rate. The pyridine-label test compound was mineralized to $^{14}CO_2$ more quickly than the diphenyl-label test compound. No volatiles other than $^{14}CO_2$ were found. The soil metabolism and degradation studies described so far showed that boscalid is finally degraded in soil to CO_2 and bound residues.

Boscalid did not show a tendency to move into deeper layers of soil and was primarily detected in the top 10 cm soil layer during field dissipation trials (four different soils) of duration up to 12-18 months. Boscalid concentrations declined to half of their initial values in 28 days to 208 days. In all trials a DT_{90} could not be reached within one year after application to bare soil.

In a confined rotational crop study in Germany, soil was treated directly with [^{14}C]-boscalid labelled in the diphenyl ring or the pyridine ring. Crops of lettuce, radish and wheat were sown into the treated soil at intervals of 30, 120, 270 and 365 days after treatment and were grown to maturity and harvested for analysis. The residues in the edible parts of succeeding crops destined for human consumption were low for lettuce and radish root, and slightly higher for wheat grain after all four plant back intervals. The major part of the residues was identified as parent. The concentration of boscalid in lettuce leaf ranged from 55.6–94.1% TRR, in radish leaf from 69.4–90.2% TRR, in radish root from 52.6–92.8% TRR and in wheat straw from 50.0–87.5% TRR. In wheat grain the concentration of parent was lower (1.9–35.4% TRR, $\leq$ 0.028 mg/kg).

Field trials on rotational crop studies were not submitted prior to this Meeting and could not be used for evaluation.

Methods of residue analysis

The Meeting received description and validation data for analytical methods for residues of boscalid in raw agricultural commodities, processed commodities, feed commodities as well as animal tissues, milk and eggs.

The methods rely on HPLC-UV, HPLC-MS/MS, GC-ECD and GC-MSD for analysis of boscalid in the various matrices. A multi-residue method with GC-ECD and GC-MSD suitable for enforcement for plant and animal commodities (LOQ values 0.0025–0.02 mg/kg) was adapted from an existing method (DFSG S19).

Numerous recovery data on a wide range of substrates were provided with validation testing of methods which showed that they were valid over the relevant concentration ranges.

Stability of residues in stored analytical samples

The Meeting received information on the freezer storage stability of residues of boscalid in wheat (green plant without roots, grain and straw), oilseed rape, sugar beet (roots), white cabbage (head), peach (fruit), peas, tomato paste, liver, milk, muscle.

Residues were stable (less than 30% disappearance) in various plant matrices over a period of 2 years and longer. Storage data were available for some animal commodities for at least 5 months, and were suitable for showing stability of the residues in samples from these studies.

Definition of the residue

The composition of the residue in the metabolism studies, the available residue data in the supervised trials, the toxicological significance of metabolites, the capabilities of enforcement analytical methods and the national residue definitions already operating all influence the decision for an appropriate residue definition.

The metabolism of boscalid was investigated in grapes, lettuce and beans. Unchanged parent compound formed the major part of the residue in these studies. The cleavage products M510F62 (chlorophenylaminobenzene) and M510F47 (chloronicotinic acid) and in addition hydroxy-parent and sugar conjugates were also identified in beans. However, all metabolites were of minor importance. Therefore only parent is included in the residue definition.

Metabolism studies performed on goats and hens show that residues in products of animal origin derive from the parent compound as well as from the hydroxylated metabolite M510F01 including its conjugates. M510F54 in chicken eggs was not found in lactating goats' tissues and milk, and M510F53 in liver and milk was not found in poultry tissues and eggs.

Ruminant feeding studies show that boscalid preferentially accumulates in cream as opposed to whole milk (concentration ratio is 9:1). The boscalid ratio between fat and muscle was about 5:1. In the metabolism studies of lactating goats, the ratio between fat and muscle was about 6:1. The log octanol-water partition coefficient was approximately 3 and also suggests that boscalid is likely to be a fat-soluble compound, although it does not accumulate in animal tissues, milk and eggs.

Based on the available comparative animal and plant metabolism studies, the Meeting recommended a residue definition for boscalid for plants and animals:

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

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

The residue is fat soluble.

Results of supervised trials on crops

The Meeting received supervised trial data for boscalid uses on apple, peach, plum, cherry, raspberries, blueberries, strawberry, grapes, banana, onion, leek, broccoli, cabbages, cauliflowers, Brussels sprouts, cucumbers, cantaloupe, summer squash, melons, tomatoes, peppers, mustard greens, lettuce, curly kale, beans, peas, soybeans, carrot, radish, potato, cereal grain (barley, wheat), almond, pecan nut, pistachio, canola, sunflower, peanuts and coffee.

Field studies on residues in follow-up and rotational crops were provided only at a late stage of the Meeting. In view of the wide range of crops in which boscalid residues may be present above the LOQ, the evaluation of residues deriving from direct application and through uptake from soil has to be assessed together, which was not possible due to late submission of the reports. Consequently, the Meeting could not make recommendations for residue levels in annual crops (onion, leek, broccoli, cabbages, cauliflower, Brussels sprouts, cucumbers, cantaloupe, summer squash, melons, strawberry, tomatoes, peppers, mustard greens, lettuce, curly kale, beans, peas, soybeans, carrot, radish, potato, canola, sunflower and peanuts). The supervised residue trials with direct application and field trials on rotational crops will be evaluated together at a future meeting when all results will become available.

Processing trials with boscalid were considered valid because the processing factors should not be influenced by higher residues than that achieved by GAP. It is common practice to apply a pesticide at an exaggerated rate in processing trials to achieve measurable levels in processed commodities.

Trials from Japan were available only in summary form and could not be evaluated.

Apples

Boscalid has approval for use on apple in the UK for up to four applications at 0.202 kg ai/ha with a 7 day PHI. Supervised trials were conducted on apple trees conforming to UK GAP in Belgium (1), Germany (6), France (11), Italy (7), and the Netherlands (1) in 2000, 2001 and 2003. The residues in ranked order were: 0.14, 0.15, 0.19, 0.20, 0.24, 0.24, 0.29, 0.29, 0.30, 0.32, 0.32, 0.34, 0.36, 0.37, 0.39, 0.39, 0.42, 0.42, 0.43, 0.49, 0.51, 0.53, 0.55, 0.65, 0.86, 1.24 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for boscalid in apples of 2 and 0.365 mg/kg respectively.

Stone fruit

Supervised trials were conducted on stone fruits in the USA (GAP: five applications at 0.256 kg ai/kg with a 0 day PHI) in 1999 and 2004. Twenty two trials were conducted on peach conforming to US GAP. The residues in ranked were: 0.16, 0.19, 0.19, 0.32, 0.32, 0.33, 0.40, 0.40, 0.42, 0.48, 0.48, 0.49, 0.49, 0.49, 0.52, 0.62, 0.64, 0.66, 0.73, 0.75, 0.79, 1.19 mg/kg.

Sixteen trials were conducted on plums conforming to US GAP in 2001 and 2004. The residues in ranked order, median underlined, were: 0.08, 0.09, 0.1, 0.11, 0.14, 0.15, 0.17, 0.17, 0.24, 0.25, 0.32, 0.34, 0.46, 0.55, 0.57, 0.70 mg/kg.

Thirteen trials were conducted on cherries conforming to US GAP in 2001 and 2004. The residues of boscalid in ranked order, median underlined, were: 0.64, 0.74, 0.76, 0.91, 1.0, 1.09, 1.21, 1.31, 1.42, 1.49, 1.5, 1.51, 1.64 mg/kg.

The data for peach was significantly different from those for plums. The data for peach and plums were also significantly different from those for cherry, and so could not be combined. The Meeting agreed to use the data from cherry and estimated a maximum residue level and an STMR value for boscalid in stone fruit of 3 and 1.21 mg/kg respectively.

Berries and other small fruits

Six supervised trials were conducted on raspberries in USA and Canada conforming to the GAP of the USA in 1999 and 2004 (GAP: four applications at 0.406 kg ai/kg with a 0 day PHI). The residues of boscalid in ranked order were: 1.49, 2.00, 2.44, 2.69, 3.45, 3.73 mg/kg.

Twelve supervised trials were conducted on blueberries in USA and Canada conforming to US GAP (0.406 kg ai/ha, four applications, 0 day PHI) in 1999 and 2004. The residues found in ranked order were: 0.84, 1.16, 1.26, 1.27, 1.46, 2.34, 2.62, 2.65, 3.79, 4.35, 6.78, 6.83 mg/kg.

The Meeting agreed that data populations for raspberries and blueberries could be combined, therefore, the residues of boscalid in ranked order, median underlined, were: 0.84, 1.16, 1.26, 1.27, 1.46, 1.49, 2.00, 2.34, 2.44, 2.62, 2.65, 2.69, 3.45, 3.73, 3.79, 4.35, 6.78, 6.83 mg/kg. The Meeting estimated a maximum residue level and STMR values for boscalid in berries and other small fruits except strawberry and grapes of 10 and 2.53 mg/kg respectively.

Boscalid is approved for use in strawberries in the UK at 0.481 kg ai/kg, a maximum of two applications with a 3 day PHI. Supervised trials conforming to UK GAP were conducted on strawberry in Demark, France, Germany, Greece, Italy, Spain, Sweden and the Netherlands in 2003 and 2004. At the GAP of the UK, residue values from outdoor trials in France were 0.20, 0.41, 0.42, 0.45, 0.89, 1.74 mg/kg; in Denmark 0.38 mg/kg; in Germany 0.19, 0.35 mg/kg; in Greece 1.87 mg/kg; in Italy 0.47, 0.68, 0.69 mg/kg; in Sweden 0.15 mg/kg; in the Netherlands 0.46 mg/kg; and those in the UK were 0.27, 0.55 mg/kg. In summary, residues of boscalid in strawberry from the 17 European trials in ranked order were: 0.15, 0.19, 0.20, 0.27, 0.35, 0.38, 0.41, 0.42, 0.45, 0.46, 0.47, 0.55, 0.68, 0.69, 0.89, 1.74, 1.87 mg/kg.

At UK GAP, the residue values from indoor trials in France were 0.28, 0.57, 0.68 mg/kg; in Italy were 0.31, 0.46 mg/kg; and in Spain were 0.23, 0.27, 0.34, 0.49 mg/kg. The ranked order of residue values were: 0.23, 0.27, 0.28, 0.31, 0.34, 0.46, 0.49, 0.57, 0.68 mg/kg.

The outdoor and indoor residue data appeared to be similar populations and were combined. The residues in ranked order were: 0.15, 0.19, 0.20, 0.23, 0.27 (2), 0.28, 0.31, 0.34, 0.35, 0.38, 0.41, 0.42, 0.45, 0.46 (2), 0.47, 0.49, 0.55, 0.57, 0.68 (2), 0.69, 0.89, 1.74 and 1.87 mg/kg.

No recommendation can be made for strawberries until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Sixteen supervised trials were conducted on grapes in USA (GAP: 0.392 kg ai/ha, three applications with a 14 day PHI) in 1999. The residues in ranked order were: 0.33, 0.34 (2), 0.36, 0.50, 0.65 (2), 0.92, 1.26, 1.38, 1.50, 1.83, 2.08, 2.28, 2.97, 3.13 mg/kg.

The Meeting estimated a maximum residue level and an STMR value for boscalid in grapes of 5 and 1.09 mg/kg respectively.

Banana

Twelve supervised trials conforming to the GAP of the USA (0.150 kg ai/ha, four applications with a 0 day PHI) were conducted on banana in Costa Rica, Panama, Guatemala, Honduras, Ecuador and Colombia in 2004. The residues in ranked order for bagged bananas were: < 0.05 (12) mg/kg. The residues in ranked order for unbagged bananas were: < 0.05 (5), 0.07, 0.07, 0.09, 0.10, 0.10, 0.11, 0.18 mg/kg. The ranked order of concentrations on banana pulp was: < 0.05 (12) mg/kg.

The unbagged and bagged residue data populations for whole fruit of banana were significantly different and could not be combined. The Meeting estimated a maximum residue level, based on unbagged bananas, and an STMR value, based on banana pulp, for boscalid in banana of 0.2 and 0.05 mg/kg respectively.

Bulb vegetables

Data from five supervised trials on green onions was received from the USA (GAP: 0.326 kg ai/ha, six applications, 7 day PHI) in 1999. The residues in ranked order on green onions were: 1.13, 2.01, 2.20, 2.39, 2.73 mg/kg.

Ten supervised trials were conducted on bulb onions in the USA (maximum GAP: 0.326 kg ai/ha, six applications, 7 day PHI) in 1999. The residues in ranked order on bulb onions were: < 0.05, 0.05, 0.1, 0.11, 0.13, 0.22, 0.78, 0.92, 0.93, 2.61 mg/kg.

Eleven supervised trials were conducted on leek in Belgium in 1999 and 2000 (maximum GAP of two applications at 0.400 kg ai/ha with a 14 day PHI), France (no national GAP, that of the Netherlands used) in 2003, Germany in 1999 and 2000 (no national GAP, that of the Netherlands used), the Netherlands in 1999 and 2000 (three 3 applications at 0.410 kg ai/ha with a 14 day PHI), UK in 2000 (no national GAP, that of the Netherlands used). In summary, residues of boscalid in leek from the 11 European trials in ranked order were: 0.58, 0.62, 0.8, 0.9, 0.93, 1.02, 1.16, 1.31 (2), 1.90, 2.30 mg/kg.

No recommendation can be made for bulb vegetables until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Brassica

Six supervised trials were conducted on broccoli in the USA in 2001 (GAP: two applications at 0.441 kg ai/ha with a 0 day PHI). The residues on broccoli in ranked order were: 0.81, 0.98, 1.45, 1.59, 1.70 and 2.70 mg/kg.

Three supervised trials were conducted on broccoli one from Germany (no national GAP, the GAP for cauliflower from the UK used: three applications at 0.267 kg ai/ha with a 14 day PHI) and two trials from France (no national GAP, that of UK cauliflower used). The residues on broccoli in ranked order were: < 0.05, < 0.05 and 0.20 mg/kg.

The data populations for the USA and the EU were deemed significantly different and as such could not be combined.

Six supervised trials were conducted on cabbage in USA in 2001 (GAP: two applications at 0.441 kg ai/ha with a 0 day PHI). The residues on cabbage in ranked order were: 0.64, 0.73, 1.06, 1.78, 2.22, 2.33 mg/kg.

Boscalid is approved for use on cauliflower in the UK at 0.267 kg ai/ha, three applications with a 14 day PHI. Seven supervised trials were conducted on cauliflower in Denmark in 2003, France in 2003 and 2004, Germany in 2004, the Netherlands in 2003 and the UK in 2003conforming with UK GAP. The residues on cauliflower in ranked order were: < 0.05 (5), 0.06, 0.55 mg/kg.

Boscalid is approved for use on Brussels sprouts in the UK at 0.267 kg ai/ha, three applications with a 14 day PHI. Nine supervised trials were conducted on Brussels sprouts in Denmark in 2003, France in 2004, Germany in 2003 and 2004, the Netherlands in 2003, Sweden in 2003 and 2004 and the UK in 2003 and 2004 conforming to UK GAP. The residues on Brussels sprouts in ranked order were: < 0.05 (2), 0.06, 0.10, 0.15, 0.16, 0.23, 0.34 and 0.40 mg/kg.

The data for broccoli was significantly different from those for Brussels sprouts (Mann-Whitney test). The data for cauliflower was significantly different from those for Brussels sprouts. The data for cabbage was significantly different from those for Brussels sprouts. The data for cabbage were significantly different from those for cauliflower and so could not be combined. The data populations for broccoli against US GAP and cabbage were not significantly different. In summary, residues of boscalid in broccoli and cabbage from the 12 US trials in rank order were: 0.64, 0.73, 0.81, 0.98, 1.06, 1.45, 1.59, 1.70, 1.78, 2.22, 2.33 and 2.70 mg/kg.

No recommendation can be made for brassica vegetables until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Fruiting vegetables, cucurbits

Ten supervised trials were conducted on cucumber in USA in 2001 and 2004 (GAP: four applications at 0.326 kg ai/ha with a 0 day PHI). The residues on cucumber in ranked order were: 0.05, 0.07 (3), 0.12, 0.13, 0.14 (2), 0.26 and 0.31 mg/kg.

Eight supervised trials were conducted on cantaloupe in USA in 2001 and 2004 (GAP: four applications at 0.326 kg ai/ha with a 0 day PHI). The residues on cantaloupe in ranked order were: 0.14, 0.23, 0.29, 0.39, 0.57, 0.56, 0.71 and 1.27 mg/kg.

Boscalid is approved for use in Germany on melons at 0.1 kg ai/ha, three applications with a 3 day PHI. Eight supervised trials, conforming to German GAP, were conducted on melons in Italy in 2000 and Spain in 1999 and 2000. The residues in ranked order were: < 0.05 (8) mg/kg.

The data populations for cantaloupe and melons were significantly different and could not be combined.

Nine supervised trials were conducted on Summer squash in USA in 2001 and 2004 (GAP: four applications at 0.326 kg ai/ha with a 0 day PHI). The residues in ranked order on summer squash were: 0.11, 0.12, 0.14, 0.16 (2), 0.19, 0.27, 0.31, 0.95 mg/kg.

The data for cucumber and summer squash appeared to be similar populations and could be combined. The data for cucumber was significantly different from those for cantaloupe. The data for cantaloupe was significantly different from those for summer squash.

No recommendation can be made for fruiting vegetables, cucurbits until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Fruiting vegetables other than cucurbits (except fungi, mushroom and sweet corn)

Supervised trials were conducted on tomatoes in USA in 1999 and 2004 (GAP: two applications at 0.613 kg ai/ha with a 0 day PHI). Twelve trials were conducted at GAP. The residues in ranked order were: 0.17, 0.21, 0.22, 0.24, 0.25, 0.27, 0.28, 0.3, 0.59, 0.61, 0.79, 0.92 mg/kg.

Supervised trials were conducted on non-bell and bell peppers in USA in 1999 and 2004 (GAP: six applications at 0.172 kg ai/ha with a 0 day PHI). In six US trials on bell peppers in 1999 matching the maximum GAP, residues of boscalid were: < 0.05, 0.08, 0.09, 0.14, 0.16, 0.3 mg/kg. In three US trials on non-bell peppers in 1999 matching maximum GAP, residues of boscalid were: 0.14, 0.30 and 0.83 mg/kg.

The data populations for non-bell and bell peppers were not significantly different data and were combined. The residues on peppers in ranked order were: < 0.05, 0.08, 0.09, 0.14 (2), 0.16, 0.3 (2), 0.83 mg/kg.

The data populations for peppers and tomatoes were not significantly different and could be combined. The residues in ranked order were: < 0.05, 0.08, 0.09, 0.14 (2), 0.16, 0.17, 0.21, 0.22, 0.24, 0.25, 0.27, 0.28, 0.3 (3), 0.59, 0.61, 0.79, 0.83, 0.92 mg/kg.

No recommendation can be made for Fruiting vegetables other than cucurbits (except fungi, mushroom and sweet corn) until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Leafy vegetables

Eleven supervised trials were conducted on Mustard greens in USA in 2001, 2004 and 2005 (GAP: two applications at 0.441 kg ai/ha with a 14 day PHI). Eight trials were conducted conforming to US GAP, with residues in ranked order of: of 0.45, 0.54, 0.92, 2.80, 3.1, 6.04, 12.9, 14.4 mg/kg.

Eight supervised trials were conducted on head lettuce and leafy lettuce in USA (GAP: two applications at 0.441 kg ai/ha with a 14 day PHI), respectively. The residues on head lettuce in ranked order were: 0.11, 0.98, 1.77, 2.53, 2.68, 2.73, 3.18, 6.15 mg/kg and on leafy lettuce were: 0.74, 1.60, 1.63, 1.91, 4.87, 5.14, 9.36 and 9.55 mg/kg.

The data populations for head lettuce and leaf lettuce were not significantly different and could be combined. The ranked order of concentrations was: 0.11, 0.74, 0.98, 1.6, 1.63, 1.77, 1.91, 2.53, 2.68, 2.73, 3.18, 4.87, 5.14, 5.42, 9.36 and 9.55 mg/kg.

Eighteen supervised trials were conducted on outdoor lettuce in France (6), Germany (5), the Netherlands (2), Spain (5) in 1999 and 2000 conforming to Belgian GAP of two applications at 0.4 kg ai/ha with a 14 day PHI. The residues on outdoor lettuce in ranked order were: < 0.05, 0.09, 0.15, 0.21, 0.33, 0.36, 0.38, 0.39, 0.43, 0.45, 0.50, 0.64, 0.65, 0.73, 0.76, 0.86, 1.19 and 1.58 mg/kg.

Eight supervised trials were conducted on indoor lettuce in France (4), Germany (1), the Netherlands (1) and Spain (2) in 2002 conforming to Belgian GAP. The residues on indoor lettuce in ranked order were: 0.37, 0.71, 1.52, 2.31, 2.50, 5.63, 5.96 and 6.11 mg/kg.

The outdoor and indoor residue data population for head lettuce in Europe were significantly different and could not be combined.

The US and European residue (indoor lettuce) data populations for head lettuce were not significantly different and could be combined. The residues on head lettuce in ranked order were: 0.11, 0.37, 0.72, 0.74, 0.98, 1.52, 1.6, 1.63, 1.77, 1.91, 2.32, 2.5, 2.53, 2.68, 2.73, 3.18, 4.87, 5.14, 5.42, 5.63, 5.96, 6.11, 9.36, 9.55 mg/kg.

Data was received from six supervised trials conducted on Curly kale in Denmark in 2000 (1), the Netherlands in 1999 (1), Sweden in 1999 (1) and UK in 1999 and 2000 (3) at 0.4 kg ai/ha (0.133 kg ai/hL). The trials did not conform to UK GAP of three applications at a rate of 0.267 kg ai/ha, i.e., treatments were made at a rate 50% higher than GAP with one extra application. As a result the data on Curly kale could not be evaluated (0.11, 0.50, 0.55, 0.67, 2.80, 3.20 mg/kg).

The combined data populations for lettuce were not significantly different from those for mustard greens and could be combined. The residues in ranked order were: 0.11, 0.37, 0.45, 0.54, 0.72, 0.74, 0.92, 0.98, 1.52, 1.60, 1.63, 1.77, 1.91, 2.32, 2.50, 2.53, 2.68, 2.73, 2.80, 3.10, 3.18, 4.87, 5.14, 5.42, 5.63, 5.96, 6.04, 6.11, 9.36, 9.55, 12.9, 14.4 mg/kg.

No recommendation can be made for leafy vegetables until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Legume vegetables

Boscalid is approved for use in France with a maximum GAP of two applications at a rate of 0.5 kg ai/ha with a 7 day PHI. Eleven supervised trials were conducted on outdoor beans in Denmark 1999 and 2000 (3), France in 2000 (4), Germany in 1999 and 2000 (4) conforming to French GAP. The residues on field grown beans, with pod, were: 0.13, 0.22, 0.26, 0.29, 0.47, 0.50, 0.53, 0.62, 0.67, 0.83, 0.95 mg/kg.

Eight supervised trials were conducted on indoor beans in Spain in 1999 and 2000 conforming to French GAP. The residues on indoor beans, with pod, in ranked order were: 0.06, 0.28, 0.28, 0.29, 0.61, 0.69, 1.65, 1.67 mg/kg.

The outdoor and indoor residue data populations for beans, with pod, were not significantly different and could be combined. The residues on beans with pod in ranked order were: 0.06, 0.13, 0.22, 0.26, 0.28, 0.28, 0.29, 0.29, 0.47, 0.50, 0.53, 0.61, 0.62, 0.67, 0.69, 0.83, 0.95, 1.65, 1.67 mg/kg.

Eleven supervised trials were conducted on peas in USA in 2001 (maximum GAP: two applications at 0.539 kg ai/ha with a 7 day PHI) where peas were shelled in eight of the trials. The residues in ranked order on shelled peas (succulent seeds) were: < 0.05 (2), 0.06, 0.07, 0.15, 0.19, 0.24, 0.37 mg/kg. The residues on peas (pod and succulent seeds) in ranked order were: 0.64, 0.97, 1.39 mg/kg.

The data populations for shelled peas (succulent seeds) in the EU and peas (pods and succulent seed) were significantly different and could not be combined.

Seventeen supervised trials were conducted on soybean in USA in 2002 (maximum GAP: two applications at 0.539 kg ai/ha with a 7 day PHI). The residues on immature soybean in ranked order were: < 0.05 (11), 0.05, 0.06, 0.08, 0.09, 0.2, 1.18 mg/kg.

Ten supervised trials were conducted on snap beans in USA in 2000 (maximum GAP: two applications at 0.5 kg ai/ha with a 7 day PHI). The residues on snap bean (young pods) in ranked order were: 0.13, 0.28, 0.36, 0.41, 0.42, 0.46, 0.52, 0.54, 0.72, 0.97 mg/kg.

Seven supervised trials were conducted on Lima bean in USA in 2000 (maximum GAP: two applications at 0.5 kg ai/ha with a 7 day PHI). The residues on Lima bean (young pods and immature beans) in ranked order were: < 0.05 (2), 0.07 (2), 0.08 (2), 0.47 mg/kg.

The data for beans with pods were significantly different from those for succulent shelled peas. The data for beans with pods were significantly different from those for immature soybean. The data for snap beans were significantly different from those for lima beans and could not be combined. The data for snap beans were not significantly different from those for beans with pod. The data populations for peas with pod and beans with pod were not significantly different. In summary, residues of boscalid in beans with pods, peas with pods and snap beans from the 32 US trials in rank order were: 0.06, 0.13 (2), 0.22, 0.26, 0.28 (3), 0.29 (2), 0.36, 0.41, 0.42, 0.46, 0.47, 0.50, 0.52, 0.53, 0.54, 0.61, 0.62, 0.64, 0.67, 0.69, 0.72, 0.83, 0.95, 0.97 (2), 1.39, 1.65, 1.67 mg/kg.

No recommendation can be made for legume vegetables until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Pulses

Ten supervised trials were conducted on beans in USA in 2000 (maximum GAP: two applications at 0.539 kg ai/ha with a 21 day PHI). The residues on dry beans in ranked order were: < 0.05 (4), 0.06, 0.09, 0.12, 0.14, 0.37, 1.92 mg/kg.

Nine supervised trials were conducted on peas in USA in 2000 (maximum GAP: two applications at 0.539 kg ai/ha with a 21 day PHI). The residues on dry peas in ranked order were: 0.05, 0.09, 0.11, 0.12, 0.16, 0.17, 0.23, 0.31, 0.46 mg/kg.

The data populations for dry beans and dry shelled peas were not significantly different and could be combined. In summary, residues of boscalid in dry beans and dry peas from the 19 US trials in rank order were: < 0.05 (4), 0.05, 0.06, 0.09, 0.09, 0.11, 0.12 (2), 0.14, 0.16, 0.17, 0.23, 0.31, 0.37, 0.39, 1.92 mg/kg.

Seventeen supervised trials were conducted on soybean in USA in 2002 (maximum GAP: two applications at 0.54 kg ai/ha with a 21 day PHI). The residues on dry soybean in ranked order were: < 0.05 (17) mg/kg.

No recommendation can be made for pulses until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Carrot

Eight supervised trials were conducted on carrot in USA in 1999 (GAP: six applications at 0.185 kg ai/ha with a 0 day PHI). In two trials in 1999, matching GAP, residues of boscalid were: 0.19, 0.12 mg/kg. In six other trials only three applications were made but the total rate applied was equivalent and residue levels at PHI were similar. The Meeting agreed to combine the data at the same total application rate. The residues on carrot in ranked order were: < 0.05, 0.06, 0.12, 0.17, 0.18, 0.19, 0.28, 0.34 mg/kg.

No recommendation can be made for carrot until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Radish

Five supervised trials were conducted on radish in USA in 1999 (no GAP). As no trials were conducted according to a GAP, the Meeting did not recommend a maximum residue level for radish.

Potato

Sixteen supervised trials were conducted on potato in USA in 2000 (GAP: two applications at 0.49 kg ai/ha with a 30 day PHI). The residues on potato in ranked order were: < 0.05 (16) mg/kg.

No recommendation can be made for potato until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Cereal grains

Boscalid is approved for use on cereal grains in Germany (GAP: two applications at 0.35 kg ai/ha with no specified PHI). Data from six supervised trials were submitted on barley conforming to German GAP from Denmark from 2005 (1), France from 2005 (2), Germany from 2005 (1), the Netherlands from 2003 (1) and the UK from 2003 (1). The residues on barley in ranked order were: < 0.01 (2), 0.02, 0.03, 0.12, 0.19 mg/kg.

Eight supervised trials were submitted on wheat conforming to German GAP from Belgium from 2005 (1), France from 2003 and 2005 (5), Germany from 2003 (1), the UK from 2003 (1). The residues on wheat in ranked order were: < 0.01, 0.01 (3), 0.03, 0.06 (2), 0.27 mg/kg.

The data populations for barley and wheat were not significantly different and could be combined. In summary, residues of boscalid in barley and wheat from the 14 EU trials in ranked order were: < 0.01 (3), 0.01 (3), 0.02, 0.03 (2), 0.06 (2), 0.12, 0.19, 0.27 mg/kg.

Tree nuts

Boscalid is approved in the USA on tree nuts with four applications at 0.256 kg ai/ha with a 25 day PHI. Data was submitted from twenty supervised trials conducted on almond in USA between 1999 and 2003. In ten trials on almond from 2003 matching GAP, residues of boscalid were: < 0.05 (20) mg/kg.

Ten supervised trials were submitted on pecan nut from the USA from 1999 conforming to US GAP, i.e., four applications at 0.256 kg ai/ha with a 25 day PHI. The residues of boscalid in pecan nuts in ranked order were: < 0.05 (10) mg/kg.

Six supervised trials were conducted on pistachio nuts in USA in 1999 (maximum GAP: 0.256 kg ai/ha, four applications, 25 day PHI). In six US trials on pistachio in 1999 matching GAP, residues of boscalid, median residue underlined, were: < 0.05(2), <u>0.19</u>, <u>0.35</u>, 0.45, 0.64 mg/kg.

The data populations for almond and pistachio, and pecan nut and pistachio were significantly different and could not be combined.

The Meeting agreed to use the data from almond and pecan, and estimated a maximum residue level and an STMR value for boscalid in tree nuts except pistachio of 0.05 (*) and 0.05 mg/kg respectively.

The Meeting agreed to use the data from pistachio, and estimated a maximum residue level and an STMR value for boscalid in pistachio of 1 and 0.27 mg/kg respectively.

Canola

Trials on canola were conducted in USA in 2000 (GAP: 0.294 kg ai/ha, two applications with a 21 day PHI). In the 16 US trials the application rate (0.45 kg ai/ha) was 50% higher than the GAP rate and at PHI of 20–22 days.

The Meeting noted that the application rate was 50% higher than GAP, and as such the residue values could not be used for evaluation.

Sunflower

Eight supervised trials were conducted on sunflower in the USA according to GAP in 2001 (GAP: two applications at 0.44 kg ai/ha with a 21 day PHI). The residues in ranked order were: < 0.05, 0.08, 0.09, 0.13, 0.16, 0.16, 0.23, 0.45 mg/kg.

No recommendation can be made for sunflower until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Peanut

Twelve supervised trials were conducted on peanut in USA according to GAP in 2000 (GAP: three applications at 0.49 kg ai/ha with a 14 day PHI). The residues in peanut in ranked order were: < 0.05 (11), 0.05 mg/kg.

No recommendation can be made for peanut until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Coffee

Seven supervised trials were conducted on coffee in Brazil in 2000 (GAP: one application at 0.075 kg ai/ha with a 45 day PHI). In four of the trials the application rate of 0.15 kg ai/ha was two times that of the maximum GAP. The Meeting noted that while the application rate was higher than GAP, the residues were below the LOQ (0.05 mg/kg) and could be used for evaluation.

The Meeting estimated a maximum residue level and an STMR value for boscalid in coffee of 0.05 (*) and 0.05 mg/kg respectively.

Animal feedstuffs

Almond hull

See previous section on almond for GAP in USA. In ten supervised trials on almond at US GAP, residues of boscalid in almond hull in rank order, with median and highest residue values underlined, were: 2.21, 2.64, 3.30, 3.42, <u>3.45</u>, <u>3.91</u>, 5.41, 6.78, 11.3, <u>11.9</u> mg/kg (fresh weight).

Allowing for the standard 90% dry matter for almond hulls (*FAO Manual*, p. 147), the Meeting estimated a maximum residue level of 15 mg/kg and an STMR of 4.1 mg/kg for almond hulls (dry weight). A highest residue level of 13 mg/kg was estimated for calculating the dietary burden of farm animals.

Straw and fodder (dry) cereal grains

In 10 trials on barley at German GAP, residues of boscalid in barley straw in rank order, median and highest residue underlined, were: 0.51, 2.5, 5.8, 13, 14, 27 mg/kg (fresh weight). See previous section on wheat for GAP in Europe. In eight trials on wheat at German GAP, residues of boscalid in wheat straw in rank order were: 3.0, 3.1, 5.3, 5.8, 7.9, 7.9, 11, 15 mg/kg (fresh weight).

Peanut fodder

See previous section on peanut for GAP in USA in 2000. Residues of boscalid in peanut hay in rank order were: 3.2, 5.8, 6.7, 6.7, 7.8, 9.0, 13, 20, 24, 28, 29 mg/kg.

No recommendation can be made for peanut fodder until the contribution of residues from direct application as well as uptake through the soil can be assessed.

Soybean forage

See previous section on soybean for GAP in USA in 2002. Seventeen supervised were conducted on soybean.

The Meeting noted that the PHIs were double that of the GAP, as such the residues could not be used for evaluation.

Soybean fodder

See previous section on soybean for GAP in USA in 2002. In 17 supervised trials on soybean at USA GAP, residues of boscalid in soybean hay in rank order were: 1.3, 1.4, 1.8, 2.0, 2.1, 2.3, 2.8, 3.6, 4.6, 4.8, 5.3, 6.7, 7.1, 7.3, 7.8, 11, 21 mg/kg.

Fate of residues during processing

The Meeting received information on the fate of boscalid residues during aqueous hydrolysis under conditions of pasteurisation, baking, brewing and boiling and sterilisation. Information was also provided on the fate of boscalid residues during the food processing of citrus, apples, plum, cherries, strawberries, grapes, white cabbage, gherkins, tomatoes, head lettuce, peas, soybeans, carrots, sugar beet, barley, winter wheat, corn, peanuts, sunflower, cotton, canola seed, mint and hops.

Boscalid was not degraded during the simulation of pasteurisation (pH 4, 90°C) nor during simulated baking, boiling, brewing (pH 5, 100°C) or during sterilisation (pH 6, 120°C).

The processing factors for wet apple pomace (6.06) and apple juice (0.08) were applied to the estimated STMR for apple (0.365 mg/kg) to produce STMR-P values for wet apple pomace (2.2 mg/kg) and apple juice (0.03 mg/kg).

The processing factors for plum to dried prunes (2.80) and to puree (1.95) were applied to the estimated STMR for plums (0.205 mg/kg) to produce an STMR-P value for prunes (0.57 mg/kg) and puree (0.40 mg/kg).

The processing factors for raisins (2.42), wet pomace (2.50), wine (0.35) and juice (0.42) were applied to the estimated STMR for grapes (1.09 mg/kg) to produce STMR-P values for raisins (2.6 mg/kg), wet pomace (2.7 mg/kg), wine (0.38 mg/kg) and grape juice (0.46 mg/kg). The processing factor for raisins (2.4) was applied to the grape residue data (HR of 3.2 mg/kg) to produce an estimated highest value for dried grapes (7.8 mg/kg).

The Meeting estimated a maximum residue level for boscalid in dried grapes (= currants, raisins, sultanas) of 10 mg/kg.

Residues in animal commodities

Farm animal feeding

The Meeting received a lactating dairy cow feeding study which provided information on likely residues resulting in animal tissues and milk from residues in the animal diet.

Lactating Holstein cows were dosed with boscalid at the equivalent of 1.5 (1×), 4.5 (3×) and 18 (12×) ppm in the dry-weight diet for 28 consecutive days. Milk was collected twice daily for analysis. Animals were sacrificed within 23 hours after the final dosing, except for one cow of the 12× group which was sacrificed seven days after the final dose to determine residue levels post dosing.

No residues were detected in milk samples taken from the control and the 1× dose groups. In a few samples from the 3× dose group, residues just above the LOQ of 0.01 mg/kg for boscalid were detected, but no residues of M510F01 or M510F02 were observed. In the group average, residues were below the LOQ. In the 12× dose group, residues of boscalid occurred regularly from day one onward with residues reaching a plateau on day 14 with average residues between 0.04 mg/kg and 0.05 mg/kg. M510F53 was below LOQ (< 0.01 mg/kg) in milk from all three treatment groups.

In the tissues, the mean residues of boscalid at the 3 dosing levels were: muscle (< 0.05, < 0.05, < 0.05 mg/kg); fat (0.06, 0.11, 0.27 mg/kg); liver (< 0.05, 0.06, 0.18 mg/kg); kidney (< 0.05, 0.07, 0.24 mg/kg).

M510F53 was below LOQ (< 0.01 mg/kg) in liver from 1× and 3× dose groups, and up to 0.09 mg/kg from 12× dose group.

Residues depleted quickly from the milk of a high-dose animal after dosing was stopped, falling below LOQ (0.01 mg/kg) after 2 days. Residues fell to below the LOQ (< 0.05 mg/kg) in all tissues. It was shown by samples from the withdrawal animal that no residues in milk was observed two day after dosing had stopped and boscalid were rapidly excreted.

Farm animal dietary burden

The Meeting noted that field trials on rotational crops were provided at a late stage of the Meeting, and decided to estimate maximum residue levels and STMRs on annual crops that may lead to animal feeds at a future JMPR when all the data can be examined together. The Meeting was also informed that a new livestock feeding study is commencing in 2007. The Meeting decided to calculate the livestock dietary burden and estimate maximum residue levels and STMRs for animal commodities at a future JMPR meeting.

RECOMMENDATIONS

On the basis of the data from supervised trials, the Meeting concluded that the residue concentrations listed below are suitable for establishing MRLs and for assessing IEDIs.

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

Definition of the residue (for estimation of dietary intake for animal commodities): *sum of boscalid, 2-chloro-N-(4'-chloro-5-hydroxybiphenyl-2-yl)nicotinamide including its conjugate, expressed as boscalid. The residue is fat soluble.*

CCN	**Commodity**	**MRL, mg/kg**	**STMR or STMR-P,**
			mg/kg
AM	Almond hulls	15	4.1
FP 0226	Apple	2	0.365
	Apple pomace		2.2
	Apple juice		0.03
FI 0327	Banana	0.2	0.05
FB 0018	Berries and other small fruits [note 1]	10	2.53
SB 0716	Coffee	0.05*	0.05
FB 0269	Grapes	5	1.09
DF 0269	Dried grapes (= currants, raisins, sultanas)	10	2.6
	Wet pomace		2.7
	Wine		0.38
	Grape juice		0.46

CCN	Commodity	MRL, mg/kg	STMR or STMR-P,
TN 0675	Pistachio	1	0.27
FS 0012	Stone fruit	3	1.21
DF 0014	Prunes		0.57
	Puree [note 2]		0.40
TN 0085	Tree nuts [note 3]	0.05*	0.05

* At or about the limit of quantification.
Note 1 except strawberry and grapes.
Note 2 processed product of plum
Note 3 except pistachio.

DIETARY RISK ASSESSMENT

Long-term intake

The Meeting could not make any recommendation for residue levels in annual crops since field studies on residues in follow-up and rotational crops were provided only at a late stage of the Meeting. In view of the wide range of crops in which boscalid residues may be present above the LOQ, maximum residue levels could not be recommended for a large number of crops. The Meeting decided that the estimation of the long-term intake would not be realistic at this time. Consequently, the long-term intake will be estimated at a future meeting when the residues deriving from both direct application and those taken up from the soil in a rotational crop situation can be evaluated together.

Short-term intake

The 2006 JMPR decided that an acute ARfD was unnecessary. The Meeting therefore concluded that the short-term intake of boscalid residues is unlikely to present a public health concern.

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