AZOXYSTROBIN (229)

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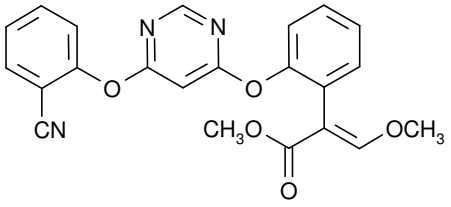
EXPLANATION

Azoxystrobin is a systemic, broad-spectrum fungicide belonging to the class of methoxyacrylates, which are derived from the naturally-occurring strobilurins. It exerts its fungicidal activity by inhibiting mitochondrial respiration in fungi. At the 39th session of the CCPR (ALINORM 07/30/24), azoxystrobin was scheduled for the evaluation as a new compound by the 2008 JMPR.

The manufacturer submitted information on physical and chemical properties, metabolism (plant and animal), environmental fate, analytical methods, storage stability, use pattern, supervised field trials, fates of residues during processing, farm animal feeding studies, and national maximum residue limits. The supervised trial information included data on citrus fruits (post-harvest and foliar treatments), stone fruits (cherry, peach and plum), berries and small fruit (blackberry, blueberry, cranberry, grapes, raspberry and strawberry), tropical fruits with inedible peel (banana, mango and papaya), bulb vegetables (bulb onion, spring onion and leeks), brassica vegetables (broccoli, Brussels sprouts, cabbage, cauliflower and kohlrabi), fruiting vegetables (cucumber, gherkin, melon, summer squash, pepper and tomato), lettuce, legume vegetables (beans and peas), pulses (soybeans), root and tuber vegetables (beetroot, carrot, chicory, potato, radish and sugar beet), stalk and stem vegetables (artichokes, asparagus, celery, witlof and chicory), cereal grains (barley, oat, rye, triticale, wheat, maize and rice), tree nuts (almonds, pecans and pistachios), oil seeds (cottonseed, peanuts and sunflower), herbs (basil, chives, parsley and mint), peanut hay, soya bean forage and hay, straw, fodder and forages of cereal grains (barley, oat, rye, triticale, wheat, maize and rice), sugar beet tops, dried herbs (basil, chives, parsley and hops), and almond hulls. Residue data on papaya was submitted by Malaysia and GAP information by Australia, Japan, and Malaysia.

IDENTITY

ISO common name:	Azoxystrobin
Chemical name:	
IUPAC:	Methyl (E)-2-{2 [6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate
CA:	Methyl (E)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxymethylene)benzeneacetate
CAS No.:	131860-33-8
CIPAC No.	571
Structural formula:	
Molecular formula:	$C_{22}H_{17}N_3O_5$
Molecular weight:	403.4 g/mol

PHYSICAL AND CHEMICAL PROPERTIES

Pure active ingredient (990 g/kg)

Property	Results	Reference
Appearance	White powder with no characteristic odour	RJ1412B Wollerton and Husband, 1993
Vapour pressure at 20 ºC	1.1×10^{-10} Pa	RJ1412B Wollerton and Husband, 1993
Melting point	116 ºC	RJ1412B Wollerton and Husband, 1993
Octanol-water partition coefficient	Log P_{ow} = 2.5 (20 ºC, pH 7)	RJ1412B Wollerton and Husband, 1993
Solubility in water at 20 ºC	6 mg/L in purified water	RJ1412B Wollerton and Husband, 1993
Relative density at 20 ºC	1.34 g/cm^3	RJ1952B Wollerton and Husband, 1995
Volatility	Henry's Law constant 7.3 x 10^{-9} Pa m^3/mol	Calculated from vapour pressure at 20 ºC and water solubility determined in purified water
Hydrolysis	DT50 at 25 ºC and pH 5–9 = stable DT50 at 50 ºC and pH 5–7 = stable DT50 at 50 ºC and pH 9 = 12.1d DT50 at 60 ºC and pH 9 = 2.6 d	RJ1717B Steel and Joseph, 1994 RJ1967B Tummon and Hurt, 1995
Photolysis (in water)	DT50 at pH 7 = 8.7–13.9 d	RJ1705B Kuet and Hadfield, 1994
Dissociation constant	Not expected to dissociate (shows neither acidic nor basic properties)	RJ1412B Wollerton and Husband, 1993
Spectral data	UV/VIS Molar absorptivity (mol^{-1} cm^{-1}): 60700 (at 202.6 nm), 17800 at (242.7 nm), 302 at (295.0 nm) IR (KBr disc) Absorption bands (cm^{-1}): 3110, 3068, 2992, 2950, 2849, 2231, 1709, 1626, 1606, 1588, 1563, 1458, 1445, 1269, 1228, 1256, 1155, 1201, 955, 688 ^{1}H-NMR (in d-chloroform) Chemical shift (ppm): 8.40 (doublet), 7.71 (double doublet), 7.67 (double double doublet), 7.50 (singlet), 7.41–7.22 (complex multiplet), 6.42 (doublet), 3.75 (singlet), 3.64 (singlet), 1.70 (singlet)	RJ1412B Wollerton and Husband, 1993
	^{13}C-NMR (in d-chloroform) Chemical shift (ppm): 171.1 (s = singlet), 170.01 (s), 167.38 (s), 160.69 (d = doublet), 157.89 (d), 154.06 (s), 150.11 (s), 134.17 (d), 133.54 (d), 132.68 (d), 129.11 (d), 126.06 (d), 125.94 (s), 125.84 (d), 123.02 (d), 122.01 (d), 115.18 (s), 107.26 (s), 106.90 (s), 92.37 (d), 61.94 (q = quartet), 51.57 (q) MS - EI Characteristic *m/z*: 403 (M^+), 388 (M-CH_3), 372 (M-OCH_3), 344 (M-CO_2CH_3, base peak), 191, 102, 75	

Technical material (962 g/kg)

Property	Results		Reference
Appearance	Pale brown powder with no characteristic odour		RJ1411B Wollerton and Husband, 1993
Density	1.25 g/cm^3 (at 25 ºC)		RJ1411B Wollerton and Husband, 1993
Melting range	114–116 ºC		RJ1411B Wollerton and Husband, 1993
Stability	Stable for at least 1 year at ambient temperature (15–25 ºC) Accelerated storage stability—stable for at least 14 days at 54 ºC Not expected to be sensitive to metals and metal ions Compatible with oxidizing and reducing agents Not expected to be explosive		RJ1411B Wollerton and Husband, 1993
Solubility in water at 20 ºC	6.7 mg/L in pH 5.2 buffered water 6.7 mg/L in pH 7 buffered water 5.9 mg/L in pH 9.2 buffered water		RJ1411B Wollerton and Husband, 1993
Solubility in organic solvents at 20 ºC	Solvent	Solubility (g/L)	RJ1411B Wollerton and Husband, 1993
	Hexane	0.057	
	Octan-1-ol	1.4	
	Methanol	20	
	Toluene	55	
	Acetone	86	
	Ethyl acetate	130	
	Acetonitrile	340	
	Dichloromethane	400	

For azoxystrobin, specifications for the technical material (TC) as well as for the SC and WG formulations (mentioned below) were established through the Joint FAO/WHO Meeting on Pesticide Specifications (JMPS) and published as FAO Specifications and Evaluations for Agricultural Pesticides compounds in 2008.[1]

Formulations

Azoxystrobin is available in the following formulations:

- Water-dispersible granule (WG) formulation containing 500 g/kg, 800 g/kg, or 0.80 lb/lb azoxystrobin usually marketed under the trade name *Amistar.*
- Suspension concentrate (SC) formulation containing 250 g/L or 2.08 lb/gallon azoxystrobin, marketed under any of the following trade names: *Ortiva, Abound, Quadris, Priori, Amistar.*

In addition, suspension concentrate (SC) formulations containing mixtures of azoxystrobin and other fungicides are available under the respective trade names:

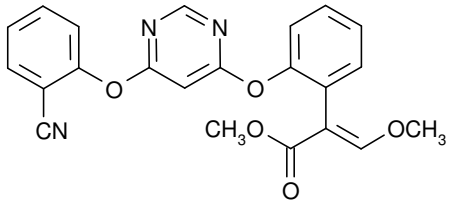
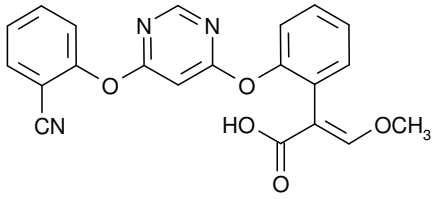
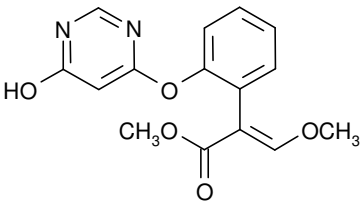
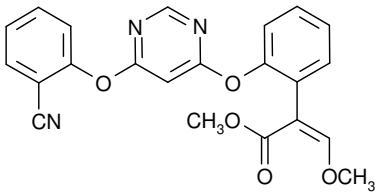
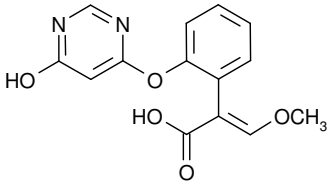
[1] see http://www.fao.org/ag/agp/agpp/pesticid/default.htm

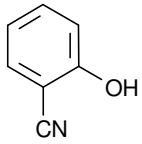
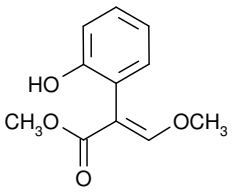
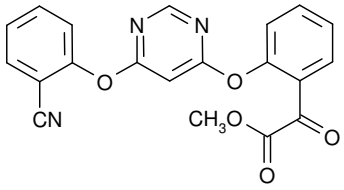
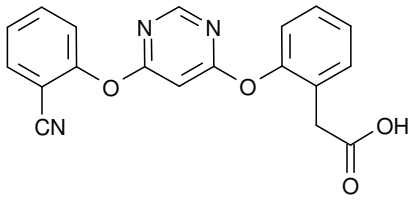
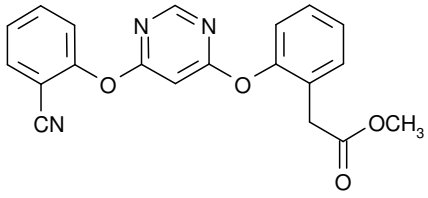
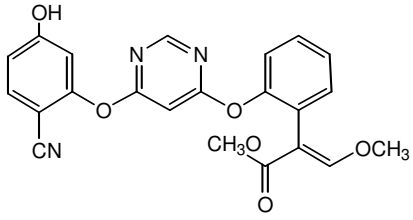
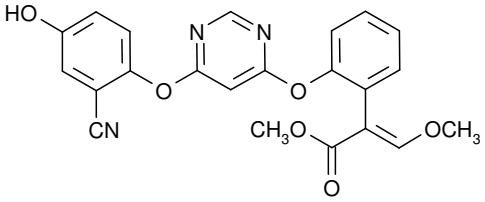
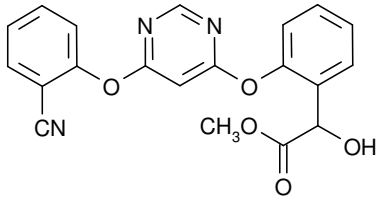
- *Quadris Opti,* containing 4.6% azoxystrobin and 46% chlorothalonil
- *Quilt*, containing 7% azoxystrobin and 11.7% propiconazole
- *Prior Xtra*, containing 20% azoxystrobin and 8% cyproconazole
- *Amistar Pro*, containing 9.8% azoxystrobin and 27.5% fenpropimorph
- *Amistar Top*, containing 20% azoxystrobin and 12.5% difenoconazole.

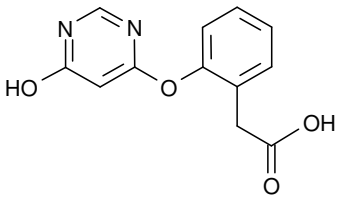
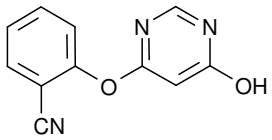
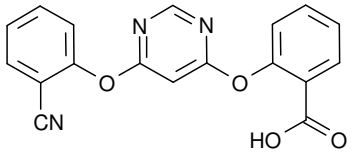
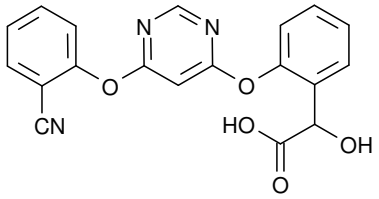
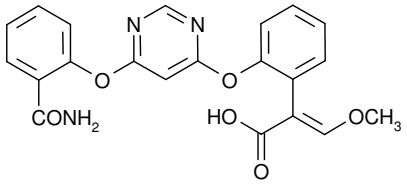
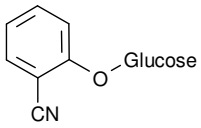
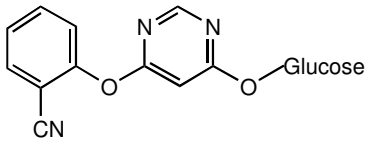
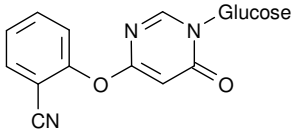
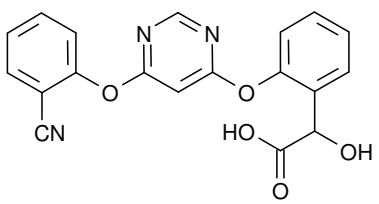
METABOLISM AND ENVIRONMENTAL FATE

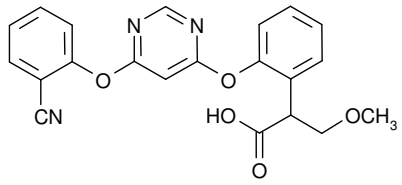
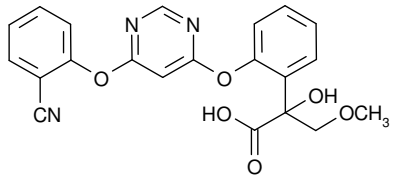
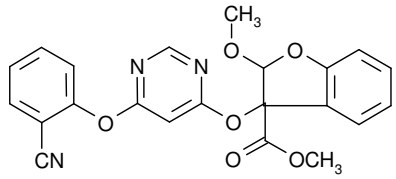
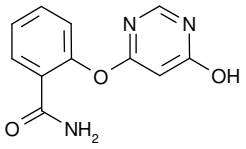
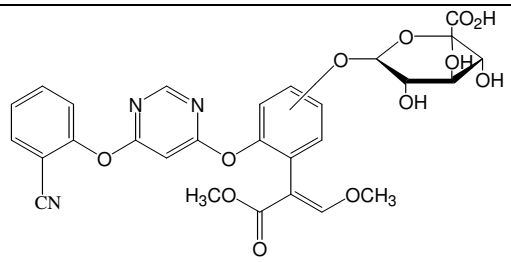
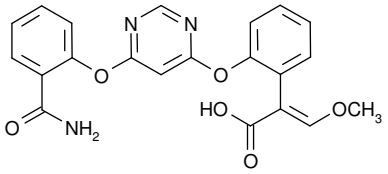
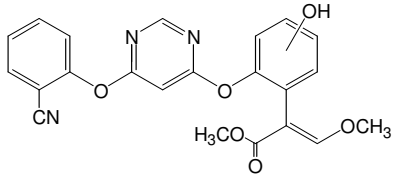
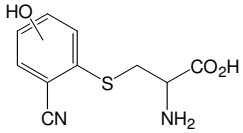
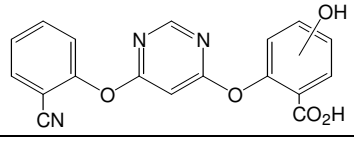
Table 1 shows compounds (including their identification number or letter, manufacturer code number, IUPAC name and structure) found in azoxystrobin metabolism and/or environmental fate studies.

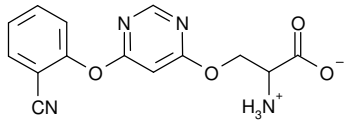
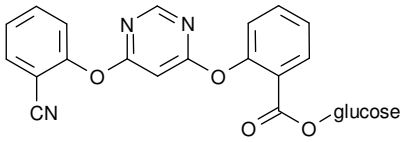
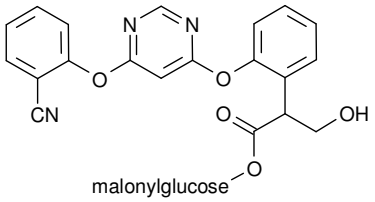
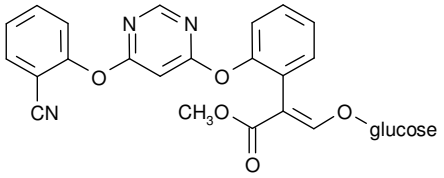
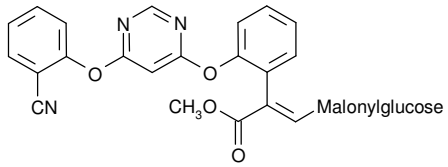
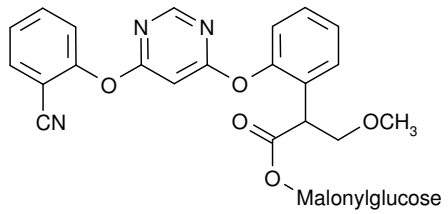
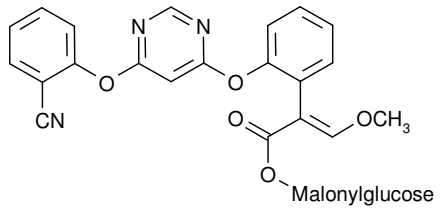
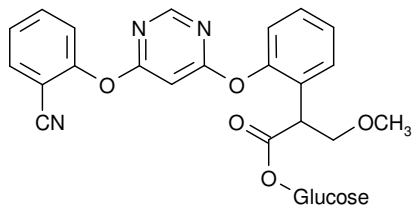
Table 1 Azoxystrobin and its metabolites/degradation products observed in metabolism and/or environmental fate studies

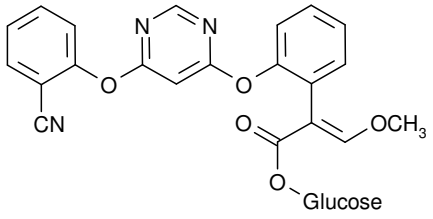
Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound 1 = Azoxystrobin (ICIA5504) Methyl (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy] phenyl}-3-methoxyacrylate		Plant metabolism Rotated crops Livestock metabolism Soil metabolism Water sediment Hydrolysis Aqueous photolysis Soil surface photolysis
Compound 2 (R234886) (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy- acrylic acid		Plant metabolism Rotated crops Livestock metabolism Soil metabolism Water sediment Hydrolysis
Compound 3 (R219277) Methyl (*E*)-2-{2-[(6-hydroxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate		Plant metabolism Rotated crops Livestock metabolism Soil metabolism Water sediment Soil surface photolysis
Compound 9 (R230310) Methyl (Z)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate		Plant metabolism Rotated crops Aqueous photolysis Soil surface photolysis
Compound 10 (R232493) (E)-2-{2-[6-(2-hydroxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylic acid		Livestock metabolism Rotated crops

Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound 13 (R71395) 2-Hydroxybenzonitrile		Plant metabolism Rotated crops Livestock metabolism Soil surface photolysis
Compound 18 (R176586) Methyl (E)-2-(2-hydroxyphenyl)-3-methoxyacrylate		Livestock metabolism
Compound 19 (R230309) Methyl 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}oxoacetate		Plant metabolism Soil surface photolysis
Compound 20 (R400050) 2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenylacetic acid		Livestock metabolism Hydrolysis
Compound 21 (R400051) Methyl 2-[6-(2-cyano- phenoxy) pyrimidin-4-yloxy]phenylacetate		Aqueous photolysis
Compound 22 (R400297) Methyl (E)-2-{2-[6-(2-cyano-5-hydroxyphenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy acrylate		Plant metabolism Rotated crops
Compound 23 (R400299) Methyl (E)-2-{2-[6-(2-cyano-4-hydroxyphenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy acrylate		Plant metabolism Rotated crops Animal metabolism
Compound 24 (R400753) Methyl 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-glycolate		Plant metabolism Rotated crops Livestock metabolism Aqueous photolysis Soil surface photolysis

Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound 26 (R401487) 2-[(6-hydroxy)pyrimidin-4-yloxy]phenylacetic acid		Rotated crops
Compound 28 (R401553) 4-(2-cyanophenoxy)-6-hydroxypyrimidine		Plant metabolism Rotated crops Livestock metabolism Soil metabolism Water sediment Aqueous photolysis Soil surface photolysis
Compound 30 (R402173) 2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]benzoic acid		Plant metabolism Rotated crops Aqueous photolysis Soil surface photolysis
Compound 35/U3 (R402987) 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-glycolic acid		Plant metabolism
Compound 36 (R403314) (E)-2-{2-[6-(2-carbamoylphenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylic acid		Plant metabolism Soil metabolism Water sediment
Compound 40 (R405270) 2-Glucosylbenzonitrile		Plant metabolism Rotated crops
Compound 41 4-(2-cyanophenoxy)-6-(ß-D-glucopyranosyloxy) pyrimidine		Rotated crops
Compound 42 (R405287) 6-(2-cyanophenoxy)-3-glucosylpyrimidin-4-one		Plant metabolism Rotated crops
Compound U3/35 (R402987) 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-glycolic acid		Plant metabolism

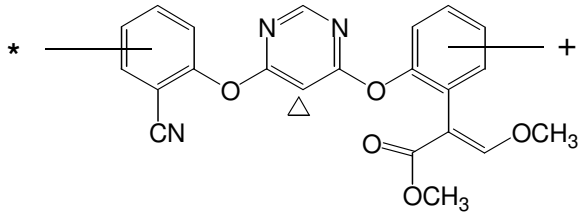
Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound U5 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxyl]-phenyl}- 3-methoxypropionic acid		Plant metabolism
Compound U6 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxyl]-phenyl}- 3-methoxylactic acid		Plant metabolism
Compound U13 Methyl 3-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]-2-methoxy-2H-3-benzofuroate		Plant metabolism Soil surface photolysis
Compound C 2-[-(6-hydroxypyrimidinyl-4-yloxy)]benzamide		Rotated crops
Compound K1 (glucuronide conjugate of Compound L1)		Livestock metabolism
Compound K2 (E)-2-{6-[2-(1-carboxy-2-methoxy-propyl)phenoxy]pyrimidin-yloxy}-benzamide		Rotated crops
Compound L1 (phenylacrylate ring hydroxy derivative of azoxystrobin)		Livestock metabolism
Compound L4 (ring hydroxy derivative of S-(2-cyanophenyl)cysteine)		Livestock metabolism
Compound L9 (phenylacrylate ring hydroxy derivative of Compound 30)		Livestock metabolism

Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound G2 2-Ammonium-3-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]propionate		Rotated crops
Compound M1 Glucosyl 2-{6-(2-cyano-phenoxy)pyrimidin-4-yloxy}benzoate		Rotated crops
Compound M2 Malonylglucosyl 3-hydroxy-2-[2-{6-(2-cyanophenoxy)pyrimidin-4-yloxy}phenyl]propionate		Rotated crops
Compound M3 Methyl(E)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-glucosylacrylate		Rotated crops
Compound O1 Methyl (E)-2-{2-[6-(2-cyanophenoxy)pirimidin-4-yloxy]phenyl}-3-(glucosylmalonyl)-acrylate		Rotated crops
Compound O2 Glucosylmalonyl 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxypropionate		Rotated crops
Compound O3 Glucosylmalonyl (E)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate		Rotated crops
Compound N1 Glucosyl (E)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxypropionate		Rotated crops

Compound (Code) IUPAC name	Structure	Identified in studies on:
Compound N2 Glucosyl -2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate		Rotated crops

Note: Compounds 1 through 42 were synthesised and the structures confirmed by NMR and mass spectroscopy (MS). Metabolites were then identified by co-chromatography with reference standards and /MS. Unlabelled reference compounds were not synthesised for the metabolites above designated U, G, N and O. These metabolites were isolated as radiolabelled compounds and identified based on spectroscopic data.

In metabolism studies azoxystrobin was uniformly labelled with ^{14}C in the cyanophenyl or phenylacrylate ring or singularly labeled in the pyrimidinyl ring as illustrated below:



* [^{14}C]Cyanophenyl-labelled azoxystrobin
△ [^{14}C]Pyrimidinyl-labelled azoxystrobin
\+ [^{14}C]Phenylacrylate-labelled azoxystrobin

Animal metabolism

The Meeting received information on the fate of azoxystrobin administered orally to lactating goats and laying hens.

Lactating goats

Lactating goats (45–55 kg) were dosed twice daily at each milking with either cyanophenyl-, pyrimidinyl, or phenylacrylate-[^{14}C]-labelled azoxystrobin in gelatin capsules at a nominal rate of 25 mg/kg in the diet (on a dry weight basis) for seven consecutive days (Mayes et al., 1995, RJ1805B; Webb et al., 1996, RJ2083B), corresponding to a daily dose of approximately 1 mg/kg bw. Dose capsules were prepared fresh and concentrations were determined each day. The dose rate was equivalent to 23–33 mg/kg in the diet. Approximately 18 hours after the final dose, the goats were sacrificed and samples of meat, fat, liver, and kidney were collected for analysis. Milk, urine, and faeces were collected throughout the dosing period.

Total radioactivity was determined using combustion and/or LSC (fatty tissues were solubilised in NCS-11 tissue solubiliser). Samples were extracted using a range of solvents of varying polarity (dichloromethane, chloroform/methanol, acetonitrile, acetonitrile/water or water). Aqueous fractions were liquid-liquid partitioned with diethyl ether, acidified and extracted using ethyl acetate and back partitioned with water. Sodium dodecylsulphate was used to dissociate proteins and lipoproteins from cell membranes. Milk, kidney and liver samples were subjected to protein precipitation. Kidney samples were also extracted using mild and strong base hydrolysis and

hydrolysis with β-glucuronidase. Identification/characterization was carried out by 2D-TLC, radio-HPLC with UV-detection or LC with MS or MS/MS detection.

Table 2 shows that the majority of the administered radiolabelled dose was recovered (90–93%). The gastrointestinal tract was not analysed which potentially accounts for the remaining radioactivity. The primary route of excretion was via the faeces (62–72% of the administered dose). Excretion via the urine accounted for a further 18–24% of the administered dose, resulting in 83–92% of the administered dose being excreted in faeces and urine. Table 3 shows that the total radioactive residues (TRR) in milk, muscle and fat were very low (0.004–0.025 mg/kg of azoxystrobin equivalents), corresponding to < 0.01% of the administered dose. Characterization of these radioactive residues by fractionation showed that they were unlikely to be attributed to any individual compound at a significant level. Radioactivity in milk reached a plateau of only 0.01 mg/L after 3–4 days of dosing. Most of the radioactivity was recovered in the liver (0.58–1.2 mg/kg) and kidney (0.18–0.25 mg/kg), corresponding to 0.2–0.4% and 0.06–0.08% of the administered dose.

Table 2 Recovery of radioactivity from lactating goats after dosing at the equivalent of 25 mg/kg in diet twice per day for seven consecutive days

Sample	% administered dose
Total recovery	90–93
Faeces	62–72
Urine	18–24
Cage washing	0.7–1.4

Table 3 Radioactive residues in milk and tissues of lactating goats

Tissue	Radioactivity concentration (mg/kg or mg/l of azoxystrobin equivalents)[a]	% administered dose [a]
Liver	0.58–1.22	0.2–0.4
Kidney	0.18–0.25	0.06–0.08
Milk	0.004–0.01	< 0.01
Muscle	0.006–0.016	< 0.01
Fat	0.011–0.025	< 0.01

[a] Range for three different labelled compounds.

Tables 4–8 summarize the distribution and characterization of radioactive residues in milk, muscle, fat, kidney, and liver, respectively. Radioactive residues in the liver and kidney were fractionated with diethyl ether at pH 7, followed by ethyl acetate at pH 2. Unextractable residues were subjected to mild alkali hydrolysis (0.1 M sodium hydroxide at 25 ºC for 24 hours). The nature of the residue was characterized by TLC. HPLC and MS were used to identify major components of the residues in the liver.

Table 4 Characterization of radioactive residues in the milk of lactating goats in mg/L of azoxystrobin equivalents (% TRR in parenthesis)

Label position	[Cyanophenyl-^{14}C]		[Pirimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	Day 1	Day 7	Day 1	Day 7	Day 1	Day 7
Total residue	0.004 (100)	0.007 (100)	0.005 (100)	0.008 (100)	0.006 (100)	0.01 (100)
Fat	0.0004 (10.7)	0.0009 (12.7)	0.0004 (8.2)	0.0008 (10.0)	0.0004 (6.9)	0.0004 (4.1)
Protein	0.0008 (20.4)	0.001 (19.3)	0.001 (23.2)	0.002 (27.5)	0.002 (34.4)	0.004 (37.1)

Label position	[Cyanophenyl-^{14}C]		[Pirimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	Day 1	Day 7	Day 1	Day 7	Day 1	Day 7
Aqueous	0.002 (61.4)	0.004 (55.1)	0.002 (48.0)	0.003 (39.3)	0.003 (57.4)	0.005 (52.4)
Filters	0.00005 (1.2)	0.0001 (2.0)	0.0002 (4.8)	0.002 (22.3)	0.00008 (1.3)	0.0001 (1.1)

Table 5 Characterization of radioactive residues in muscle of lactating goats

Label position	[Cyanophenyl-^{14}C]		[Pirimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	mg/kg[a]	%TRR	mg/kg[a]	%TRR	mg/kg[a]	%TRR
Total residue	0.006	100	0.008	100	0.016	100
Diethyl ether (pH7)	0.0009	15.2	0.001	11.7	0.001	7.2
Ethyl acetate (pH2)	0.0007	12.4	0.001	6.9	0.0004	2.5
Aqueous	0.0006	9.9	0.001	6.4	0.0008	4.7
Debris	0.004	62.9	0.006	72.3	0.014	84.8
Filters	0.00002	0.4	NS	–	NS	–

[a] mg/kg of azoxystrobin equivalents;

NS = no sample

Table 6 Characterization of radioactive residues in fat of lactating goats

Label position	[Cyanophenyl-^{14}C]		[Pyrimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	mg/kg[a]	%TRR	mg/kg[a]	%TRR	mg/kg[a]	%TRR
Total residue	0.011	100	0.012	100	0.025	100
Acetonitrile	0.005	41.5	0.007	59.6	0.010	39.6
Hexane	0.001	9.0	< 0.0003	< 2.2	0.0008	3.2
Dichloromethane	0.0005	4.5	0.0006	5.2	NS	–
Dichloromethane 'fat'[b]	0.0001	1.2	NS	–	NS	–
Debris	0.004	38.2	0.004	31.5	0.014	56.4
Filters	0.0001	1.2	0.0001	0.9	0.00003	0.1

[a] mg/kg of azoxystrobin equivalents;

[b] fat precipitate;

NS = no sample

Table 7 Characterization of radioactive residues in kidney of lactating goats

Label position	[Cyanophenyl-^{14}C]		[Pyrimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	mg/kg[a]	%TRR	mg/kg[a]	%TRR	mg/kg[a]	%TRR
Azoxystrobin	0.002	1.2	0.002	0.8	0.005	2.0
Compound 2	0.02	10.9	0.006	2.4	0.005	2.0
Compound 20	0.01	6.9	0.05	20.4	0.02	8.7
Compound 23	0.002	0.8	0.004	1.5	0.003	1.4
Compound 28	NA	NA	0.01	5.0	NP	NP
K1	0.03	15.5	0.03	10.0	0.02	8.2
L1	0.007	3.8	0.009	3.7	0.009	3.5
Total identified		39.1		43.8		25.8
K2 (not identified)	0.003	1.7	0.01	4.0	0.009	3.7

Label position	[Cyanophenyl-^{14}C]		[Pyrimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	mg/kg[a]	%TRR	mg/kg[a]	%TRR	mg/kg[a]	%TRR
Unknowns < 0.01 mg/kg (number)	0.03 (12)	16.8	0.05 (18)	18.6	0.05 (19)	22.9
Organic fraction	0.009	5.1	None	None	None	None
Aqueous fraction	0.02	13.1	0.04	17.1	0.06	24.5
Debris and filters	0.02	12.2	0.01	4.1	0.02	7.4
Remainder	0.03	15.1	0.02	9.7	0.03	13.2
Losses/gains	–0.006	–3.1	0.01	2.7	0.01	2.5
Total	0.18	100	0.25	100	0.24	100

[a] mg/kg of azoxystrobin equivalents;

NP = not present;

NA = no analysis done

Table 8 Characterization of radioactive residues in liver of lactating goats

Label position	[Cyanophenyl-^{14}C]		[Pyrimidinyl-^{14}C]		[Phenylacrylate-^{14}C]	
	mg/kg[a]	%TRR	mg/kg[a]	%TRR	mg/kg[a]	%TRR
Azoxystrobin	0.007	0.6	0.009	1.5	0.02	1.8
Compound 2	0.02	1.9	0.004	0.7	0.008	0.8
Compound 3	NP	NP	0.004	0.5	0.005	0.5
Compound 10	NP	NP	0.002	0.3	0.003	0.3
Compound 13	0.03	2.5	NP	NP	NP	NP
Compound 20	0.002	0.2	0.006	0.9	0.007	0.7
Compound 28	0.04	3.0	0.13	19.8	NP	NP
L1	0.02	1.8	0.02	3.6	0.03	3.4
L4	0.35	29.4	NP	NP	NP	NP
K1	0.006	0.5	0.01	1.9	0.005	0.5
L9	NP	NP	0.006	1.0	0.01	1.4
Total identified		39.9		30.2		9.4
L2	0.008	0.7	0.009	1.4	0.01	1.3
L3	NQ	NQ	0.006	1.0	0.01	1.2
L6	0.01	0.9	0.001	0.2	0.003	0.3
L12	ND	ND	0.01	1.6	0.01	1.1
L24	0.02	2.0	0.0006	0.1	0.01	1.1
Unknowns[b] (number)	0.05 (11)	4.2	0.07 (17)	11.5	0.15 (19)	15.2
Baseline	0.03	2.2	0.01	2.0	0.03	2.8
Aqueous fraction	0.26	21.9	0.22	34.0	0.53	52.3
Debris and filters	0.09	7.4	0.03	4.7	0.04	3.5
Remainder	0.15	12.3	0.05	7.6	0.12	12.4
Losses/gains	0.10	8.5	0.04	5.7	–0.009	–0.9
Total	1.19	100	0.64	100	1.00	100

[a] mg/kg of azoxystrobin equivalents

[b] unknown compounds L10 and L7 were later found to be artefacts of the extraction process (Turner and Bramley, *et al.,* 1995; RJ1957B)

NP = not present; ND = not detected with this position of radiolabelling

In goat kidney, the major metabolites included Compound 20 (0.01–0.05 mg/kg, 6.9–20% TRR), Compound K1 (0.02–0.03 mg/kg, 8.2–16% TRR), and Compound 2 (0.005–0.02 mg/kg, 2.0–11% TRR). These metabolites were also present in goat liver but not as major metabolites (only 0.2–0.9, 0.5–1.9, and 0.7–1.9% TRR, respectively). The major metabolite detected in liver of goats dosed with [cyanophenyl-^{14}C]-labelled azoxystrobin was Compound L4 (0.35 mg/kg, 29% TRR), whereas Compound 28 was the major metabolite in liver of goats dosed with [pyrimidinyl-^{14}C]-labelled azoxystrobin (0.13 mg/kg, 20% TRR). Compound L4 was not detected in kidney, and Compound 28 accounted for only 5.0% TRR in kidney of goats dosed with [pyrimidinyl-^{14}C]-labelled azoxystrobin. Azoxystrobin parent was present at low levels in both the kidney (0.002–0.008 mg/kg, 0.8 to 2.0% TRR) and the liver 0.007–0.02 mg/kg, 0.6–1.8% TRR).

Laying hens

(White Leghorn), weighing about 2 kg, were dosed once daily with either cyanophenyl, pyrimidinyl, or phenylacrylate-[^{14}C]-labelled azoxystrobin in gelatine capsules at a nominal rate of 1.5 mg/day for ten consecutive days (Bramley and Turney, 1996, RJ2084B), corresponding to a daily dose of approximately 0.75 mg/kg bw. The dose was equivalent to an intake of approximately 11–12 mg azoxystrobin/kg in the diet. About 23 hours after the final dose, the hens were sacrificed and samples of liver, thigh, breast muscle, peritoneal fat, and skin with underlying subcutaneous fat were taken for analysis. Excreta were collected at 24-hour intervals throughout the dosing period. Eggs were collected twice daily.

For three hens of each study, the amounts of radioactivity in their excreta were measured separately and a recovery of the administered radioactivity for each hen was calculated. The radioactive residues in the eggs and edible tissues of these three hens were also measured separately. For the remaining hens, excreta and tissues were pooled and analysed as a single representative sample. The eggs from these hens were not analysed. In these studies, only the total radioactivity was measured in the eggs and tissues.

The recovery of the administered radiolabelled dose was 93–98%. The gastrointestinal tract was not analysed, which potentially accounts for the remaining radioactivity. The majority of the administered dose was excreted in faeces (91–97%). The cage washings accounted for no more than 2.0% of the administered dose. Radioactive residues in tissues and eggs accounted for $\leq$ 0.2% of the dose. The concentrations of the radioactivity in the tissues and eggs are summarized in Table 9 and extractable radioactivity is summarised in Table 10.

Table 9 Total radioactive residues in tissues and eggs from hens dosed with labelled azoxystrobin

Tissue	mg/kg of azoxystrobin equivalent		
	[pyrimidinyl-^{14}C]	[cyanophenyl-^{14}C]	[phenylacrylate-^{14}C]
Liver	0.107	0.082	0.111
Thigh muscle	0.008	0.005	0.018
Breast muscle	0.006	0.004	0.016
Skin with underlying fat	0.018	0.015	0.039
Peritoneal fat	0.014	0.004	0.007
Egg White (Plateau)[a]	0.011	0.008	0.008
Egg Yolk (Plateau)[a]	0.144	0.040	0.099
Whole Egg (Maximum)	0.059	0.020	0.041

[a] Residues in egg whites and yolks reached a plateau after 3–4 days and 6–8 days of dosing, respectively.

Azoxystrobin is rapidly excreted and metabolized in hens, with minimal retention of the parent and its metabolites in the tissues. Residues in muscle, egg white, skin with underlying fat, and peritoneal fat were in the range of 0.004–0.039 mg/kg. The highest radioactive residues were in egg

yolk (0.040–0.14 mg/kg) and liver (0.082–0.11 mg/kg), both of these representing ≤ 0.1% of the administered dose. These residues were fractionated to show that no single organosoluble fraction exceeded < 0.01 mg/kg and aqueous or unextractable fractions represented < 0.05 mg/kg.

Table 10 Extractable radioactivity (%TRR) in hen tissues and eggs

	Hexane			Dichloromethane			Acetonitrile			Acetonitrile/water			Water			0.1M NaOH			Debris/filters		
Labelling position	py	ph	cy	py	ph	cy	py	ph	cy	py	ph	cy	py	ph	cy	py	ph	cy	py	ph	cy
Liver	NU	1.2	1.1	NU	NU	NU	20.3	12.5	12.0	10.9	4.3	13.0	7.1	14.8	10.9	58.1	62.7	57.2	2.4	6.6	4.3
Egg yolk	NU	1.5	1.0	38.2	NU	NU	8.8	11.7	29.3	2.2	5.6	4.9	4.1	16.0	17.7	26.5	50.4	32.3	2.1	17.6	16.6
Egg white	NU	NU	NU	NU	NU	NU	63.8	45.7	84.8	3.2	12.7	8.8	5.1	3.9	1.5	NU	NU	NU	27.9	37.7	4.9
Peritoneal fat	NU	NU	NU	75.7	NU	NU	4.1	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	NU	20.2	76.0	NU
Muscle	NU	8.0	NU	NU	NU	NU	NU	8.8	NU	NU	4.3	NU	NU	2.9	NU	NU	NU	NU	NU	NU	NU
Skin with underlying fat	13.3	10.1	7.4	NU	NU	NU	15.7	14.1	25.3	NU	4.5	8.0	NU	2.1	3.7	NU	NU	NU	71.1	69.2	55.6

NU = not used

py = [pyrimidinyl-^{14}C]

ph = [phenylacrylate-^{14}C]

cy = [cyanophenyl-^{14}C]

Residues in egg whites reached a plateau of only 0.008–0.011 mg/kg after 3–4 days of dosing. In egg yolks, the residues plateaued at 0.040–0.14 mg/kg after 6–8 days of the dosing.

Azoxystrobin (< 0.001–0.006 mg/kg, 0.3–12% TRR) and Compound 28 (0.002–0.004 mg/kg of parent equivalents, 1.8–8.4% TRR), were identified in egg yolk. A significant portion of the radioactivity (0.018 mg/kg parent equivalents; 15% TRR) in egg yolk from the pyrimidinyl dose was due to the breakdown of azoxystrobin into small components, which were then incorporated through biosynthetic pathways into fatty acids.

Proposed metabolic pathways in animals

The metabolism in the goat and hen was quantitatively similar to rats. In the goat and hen, azoxystrobin was rapidly metabolized with the majority (83–92% and 91–97%, respectively) of the administered radiolabelled dose excreted in the faeces and urine. The total radioactive residues in goat milk, muscle, and fat were very low and characterization showed that the residues were unlikely to be attributed to any individual compound at a significant level. The residues were higher in kidney and liver, reflecting the role of these organs in metabolism and excretion. The hen metabolism studies also showed very low transfer of TRR into tissues and eggs. Levels of radioactive residues in milk and egg whites plateaued within 3–4 days; the plateau in egg yolks was reached within 6–8 days of dosing.

The proposed metabolic pathway for azoxystrobin in goats and hens (poultry) is shown in Figure 1. The extensive metabolism of azoxystrobin in the lactating goat includes to following proposed mechanisms:

(i) Cleavage of the ether linkage between the phenylacrylate ring and the pyrimidinyl ring to give Compound 28.

(ii) Cleavage of the ether linkage between the cyanophenyl ring and the pyrimidinyl ring to give Compounds 13 and 3.

(iii) Hydrolysis of the ester group or oxidative o-dealkylation to give Compound 2, which is further metabolized by cleavage of the ether linkage between the cyanophenyl ring and the pyrimidinyl ring to give Compound 10 (Compound 10 could also result from o-demethylation of Compound 3, and Compound 2 also undergoes o-demethylation to give Compound 20).

(iv) Hydroxylation of the phenylacrylate ring (hydroxyl position undetermined) to give Compound L1, followed by conjugation with glucuronic acid to give Compound K1.

(v) Hydroxylation on the cyanophenyl ring to give Compound 23.

(vi) Hydroxylation of the phenylacrylate ring (hydroxyl position undetermined) followed by oxidative degradation of the methoxyacrylate group to the benzoic acid to give Compound L9 (the formation of L9 could follow the formation of L1, depending on the hydroxyl position).

Several mechanisms were proposed for the formation of Compound L4 (the major metabolite in liver), which should involve hydroxylation of the cyanophenyl ring, cleavage of the ether linkage between the cyanophenyl ring and the pyrimidinyl ring, and conjugation with cysteine (different order of these reactions, resulting in different hydroxyl position on the cyanophenyl ring, which was not determined). The hen metabolism also includes formation of Compounds 28, 13, and 2, in addition to the incorporation of the fragment of the pyrimidinyl ring in fatty acids.

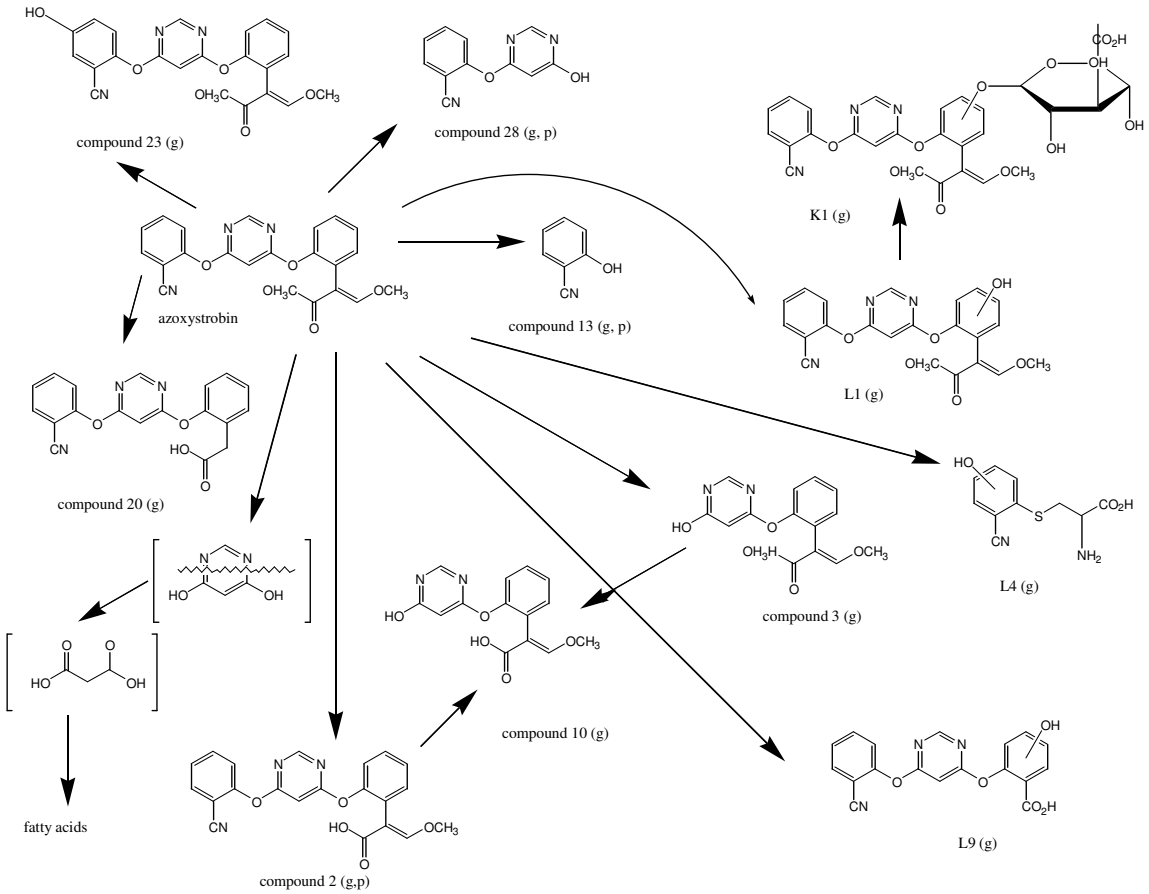


Figure 1 Proposed metabolic pathway of azoxystrobin in goats (g) and poultry (p).

Plant metabolism

The Meeting received information on azoxystrobin metabolism studied in wheat, grapes, peanuts, rice, and cotton.

Wheat

Two studies were carried out between 1991 and 1994 in the United Kingdom to determine the uptake and metabolism of azoxystrobin in wheat grown under field conditions (Wilkinson *et al.,* 1994, RJ1682B). The first study was conducted with [pyrimidinyl-^{14}C]azoxystrobin and the second with either [cyanophenyl-^{14}C] or [phenylacrylate-^{14}C]azoxystrobin. In all cases, the radiolabelled azoxystrobin was formulated as a suspension concentrate containing 250 g ai/L and applied as a foliar spray twice at a nominal rate of 0.5 kg ai/ha. Applications were made at BBCH growth stages 30–31 and 59–61. Approximately 10% of the treated plants were harvested as immature wheat (forage) 13 days after the second treatment. The mature crop was harvested 61–62 days after the last treatment and separated into grain, straw, chaff, and ear stems. Only the forage, grain, and straw samples were analysed.

The radioactive residues in the grain, straw and forage, for each radiolabel, were extracted with acetonitrile, acetonitrile/water and water. Extracts were fractionated by liquid/liquid partition and solid phase extraction. Extracts were analysed by 1 and 2-dimensional TLC and radioactive regions located by autoradiography or bio-imaging analysis. HPLC was used to identify radioactive sugars formed by natural incorporation of $^{14}CO_2$ and to isolate metabolites MS analysis. Enzymes and 0.1M sodium hydroxide were used to examine unextracted residues. Enzymes were also used to hydrolyze conjugated metabolites.

The metabolic profile of azoxystrobin in wheat was very complex with at least 23 metabolites detected. Residues were mainly in the forage and straw. The total radioactive residues in the grain were very low (Table 11). The metabolic profile of the extractable residue of azoxystrobin was essentially the same in each analysed commodity and very similar in each radiolabel.

Table 11 Total radioactive residues in wheat

Sample	Cyanophenyl label (mg/kg)	Pyrimidinyl label (mg/kg)	Phenylacrylate label (mg/kg)
Grain	0.075	0.077	0.076
Straw	9.41	3.06	7.22
Forage	2.79	1.02	2.14

In wheat grain, the total radioactive residues ranged from 0.075–0.077 mg/kg (azoxystrobin equivalents). The results of characterization of the residues in wheat grain are shown in Table 12. The only significant residue in grain was the parent, azoxystrobin, (17–22% of the TRR, equivalent to 0.013–0.017 mg/kg). No other discrete metabolite was present at greater than 3.3% TRR (0.002 mg/kg). In total, 41–44% (0.031–0.034 mg/kg) of TRR was identified and 2.4–5.5% (0.002–0.004 mg/kg) characterized by TLC or HPLC. A further 7.1–14% (0.005–0.01 mg/kg) was identified as methanol-soluble polar/conjugates fractions. All other fractions were less than 9.3% of TRR (0.007 mg/kg). About 12–16% (0.01–0.012 mg/kg) remained unextracted following both solvent extraction and enzyme hydrolysis. Unanalysed extracted radioactivity accounted for up to 27% (0.02 mg/kg) of the residue. Naturally this incorporated glucose comprised 9.7–21% (0.007–0.016 mg/kg) of the total radioactive residue.

Table 12 Characterization of the radioactive residues in treated wheat grain

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	17.1	0.013	17.3	0.013	22.0	0.017

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Compound 2	3.3	0.002	0.5	< 0.001	1.6	0.001
Compound 9	2.4	0.002	1.4	0.001	2.3	0.002
Compound 13	0.6	> 0.001	NP[a]	NP[a]	NP[a]	NP[a]
Compound 19	ND[b]	ND[b]	ND[b]	ND[b]	0.7	0.001
Compound 23	0.7	0.001	ND[b]	ND[b]	0.5	< 0.001
Compound 24	0.7	0.001	0.5	< 0.001	0.8	0.001
Compound 28	3.1	0.002	1.4	0.001	NP[a]	NP[a]
Compound 35	1.5	0.001	0.7	0.001	1.3	0.001
U5[c]	0.3	< 0.001	0.2	< 0.001	0.5	< 0.001
U6[c]	0.5	< 0.001	0.4	< 0.001	0.5	< 0.001
U13[d]	ND[b]	ND[b]	0.3	< 0.001	0.6	< 0.001
Glucose[e]	13.8	0.010	20.9	0.016	9.7	0.007
Other sugars[e]	1.7	0.001	ND[b]	ND[b]	ND[b]	ND[b]
Unidentified compounds[f]	3.8	0.003	2.4	0.002	5.3	0.004
Unanalysed extracted radioactivity	23.5	0.018	27.0	0.020	24.8	0.019
Unextracted	16.0	0.012	12.4	0.010	15.7	0.012
Balance[g]	4.5	0.003	6.3	0.005	6.1	0.005
Total	100	0.075	100	0.077	100	0.076

[a] Not present with this radiolabel position

[b] Not detected

[c] Structure tentatively assigned from MS analysis

[d] Structure established by NMR and MS analysis

[e] This results from the incorporation of $^{14}CO_2$ (generated by degradation in the soil) into these sugars

[f] All the individual components of this unidentified radioactivity were present at levels of ≤ 0.001 mg/kg

[g] Radioactivity on chromatograms not assigned to any discrete component

In wheat straw, the total radioactive residues ranged from 3.1 to 9.4 mg/kg (azoxystrobin equivalents). The results of characterization of the residues in wheat straw are shown in Table 13. As in grain, the major residue was the parent, azoxystrobin (22–43% of the TRR, equivalent to 0.67–4.1 mg/kg). Fourteen metabolites were identified, of which Compound 28 was the most significant (sum of free, conjugated and bound forms, 8.2–10% of the TRR, equivalent to 0.32–0.77 mg/kg). Compound 28 is the product of the cleavage of the ether linkage between the phenyacrylate ring and the pyrimidinyl ring. It was also detected as a simple sugar conjugate at levels of 0.8 to 2.8 % (0.075–0.086 mg/kg). The two other important metabolites were Compound 2 (3.0–3.4% of the TRR, equivalent to 0.10–0.29 mg/kg) and Compound 9, the *Z*-isomer of azoxystrobin (2.1–3.5% of the TRR, equivalent to 0.064–0.33 mg/kg). Compound 2 can be formed from azoxystrobin either by hydrolysis of the ester group or by oxidative de-alkylation. Compound 9 is the photoisomerization product of azoxystrobin. No other discrete metabolite comprised more than 2.4% of the TRR (0.13 mg/kg). In total, 48–66% of TRR (1.5–6.2 mg/kg) was identified and 7.9–18% (0.53–1.3 mg/kg) was characterized by TLC. All other extractable fractions were below 2.8% (< 0.11 mg/kg). About 6.5–8.1% (0.25–0.61 mg/kg) remained unextracted following both solvent extraction and alkali hydrolysis.

Table 13 Characterization of the radioactive residues in treated wheat straw

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	43.3	4.07	22.1	0.676	39.7	2.87
Compound 2	3.1	0.292	3.4	0.104	3.0	0.217
Compound 9	3.5	0.329	2.1	0.064	3.3	0.238
Compound 13	0.6	0.056	NP[a]	NP[a]	NP[a]	NP[a]
Compound 19	0.6	0.056	0.7	0.021	0.5	0.036
Compound 23	0.4	0.038	0.9	0.028	0.6	0.043
Compound 24	1.1	0.104	1.5	0.046	1.0	0.072
Compound 28	8.2	0.771	10.4	0.319	NP[a]	NP[a]
Compound 29	NA[b]	NA[b]	Trace	Trace	NA[b]	NA[b]
Compound 30	0.1	0.009	0.2	0.006	0.3	0.022
Compound 35	1.4	0.132	2.2	0.067	1.4	0.101
U5[c]	0.5	0.047	0.9	0.028	0.7	0.051
U6[c]	1.1	0.104	1.2	0.037	1.00	0.072
U13[d]	0.9	0.085	0.8	0.024	0.8	0.058
Artefacts[e]	0.9	0.085	1.7	0.052	1.6	0.116
Unidentified compounds[f]	7.9	0.743	17.4	0.532	17.4	1.26
Unanalysed extracted radioactivity	4.0	0.376	6.0	0.183	4.3	0.310
Unextracted	7.3	0.650	8.9	0.272	8.0	0.577
Balance[g]	8.6	0.809	9.6	0.294	8.0	0.578
Total	100	9.41	100	3.06	100	7.22

[a] Not present with this radiolabel position

[b] Not analysed

[c] Structure tentatively assigned from MS analysis

[d] Structure established by NMR and MS analysis

[e] Artefacts generated by 0.1M NaOH hydrolysis

[f] No individual component of this unidentified radioactivity exceeded 2.4% of the TRR or 0.104 mg/kg

[g] Radioactivity on chromatograms not assigned to any discrete component

In wheat forage, the total radioactive residues ranged from 1.0–2.8 mg/kg (azoxystrobin equivalents). The results of characterization of the residues in forage are shown in Table 14. The major component of the residue was the parent, azoxystrobin (55–65% of the TRR, equivalent to 0.56–1.8 mg/kg). Twelve metabolites were identified, the most significant of which were Compound 28 (free, conjugated and bound forms, 3.2–3.7% of the TRR, equivalent to 0.038–0.090 mg/kg) and Compound 9, the *Z*-isomer of azoxystrobin (1.9–2.9% of the TRR, equivalent to 0.019–0.081 mg/kg). In total, 66–76% of the TRR (0.67–2.1 mg/kg) was identified and 9–14% (0.14–0.25 mg/kg) was characterized by TLC. All other extractable fractions were below 1.4% (0.033 mg/kg). About 4.6–7.7% (0.079–0.13 mg/kg) remained unextracted following solvent extraction.

Table 14 Characterization of the radioactive residues in treated wheat forage

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	64.7	1.81	54.9	0.560	64.4	1.38
Compound 2	0.7	0.020	0.8	0.008	0.7	0.015
Compound 9	2.9	0.081	1.9	0.019	2.4	0.051
Compound 13	0.5	0.014	NP[a]	NP[a]	NP[a]	NP[a]
Compound 19	0.3	0.008	0.8	0.008	ND[b]	ND[b]
Compound 23	0.3	0.008	0.4	0.004	0.7	0.015
Compound 24	1.1	0.031	0.7	0.007	1.1	0.024
Compound 28	3.2	0.090	3.7	0.038	NP[a]	NP[a]
Compound 35	0.7	0.020	0.8	0.008	0.90	0.019
U5[c]	0.3	0.008	0.4	0.004	0.3	0.006
U6[c]	0.4	0.011	0.8	0.008	0.7	0.015
U13[d]	0.5	0.014	0.5	0.005	0.8	0.017
Unidentified compounds[e]	9.0	0.251	13.7	0.140	11.1	0.238
Aqueous methanol fraction	1.3	0.036	1.6	0.016	1.2	0.026
Unextracted	4.6	0.128	7.7	0.079	5.2	0.111
Balance[f]	5.4	0.151	6.9	0.070	8.0	0.171
Total	100	2.79	100	1.02	100	2.14

[a] Not present with this radiolabel position

[b] Not detected

[c] Structure tentatively assigned from MS analysis

[d] Structure established by NMR and MS analysis

[e] All the individual components of this unidentified radioactivity were present at levels of ≤ 0.045 mg/kg

[f] Radioactivity on chromatograms not assigned to any discrete component

An additional study on winter wheat was carried out to determine the metabolism of azoxystrobin when applied later in the season at BBCH growth stage 71 (Allin *et al.*, 1995, RJ1888B). In a field trial performed in the United Kingdom between 1991 and 1994, [pyrimidinyl-^{14}C]azoxystrobin was applied once as a 250 SC formulation to winter wheat, at a nominal rate of 250 g ai/ha. The crop was harvested as mature, dry wheat with a 28 day pre-harvest interval (PHI). Grain and straw were analysed. The metabolic pathway of the extractable residue of azoxystrobin was essentially the same in both commodities. The total radioactive residues in grain and straw were 0.066 and 2.5 mg/kg, respectively. Details of the characterization of the radioactive residues from this study are summarized in Tables 15 and 16. The results of this study were consistent with those from the previous wheat metabolism study. In both studies, azoxystrobin was the major component of the residue in grain and straw.

In wheat grain, the only relevant radioactive residue was the parent, azoxystrobin (31% TRR, 0.020 mg/kg). A total of four metabolites were identified, the most significant of which were Compound 28 (3.4% of TRR, 0.002 mg/kg) and Compound 9 (2.6% of TRR, 0.002 mg/kg). No other metabolite exceeded 1.4% TRR (0.001 mg/kg equivalent). In total, 39% (0.026 mg/kg) of the TRR was identified and a further 2.0% (0.001 mg/kg) characterized by TLC. About 31% (0.020 mg/kg) of the total radioactive residue remained unextracted following solvent extraction.

In wheat straw, the major component of the radioactive residue was the parent, azoxystrobin (51% TRR, 1.3 mg/kg). A total of six metabolites were identified, the most significant of which were

Compound 9 (2.9% TRR, 0.073 mg/kg), Compound 24 (2.9% TRR, 0.073 mg/kg) and Compound 28 (3.0% TRR, 0.076 mg/kg), of which 0.8% (0.02 mg/kg) was in the conjugated form.

Table 15 Characterization of the radioactive residues in wheat grain treated with [pyrimidinyl-^{14}C]-azoxystrobin at BBCH 71

Compounds detected (free and conjugated) and fractions characterized	% TRR	mg/kg
Azoxystrobin	30.5	0.020
Compound 2	1.4	0.001
Compound 9	2.6	0.002
Compound 24	1.1	0.001
Compound 28	3.4	0.002
Unidentified compounds[a]	1.4	0.001
Polar compounds	5.4	0.004
Water soluble radioactivity	18.8	0.013
Unextracted radioactivity	30.5	0.020
Losses during work-up	0.6	< 0.001
Remainder[b]	4.3	0.003
Total	100	0.066

[a] All the individual components were < 0.7% of the TRR (i.e. none > 0.001mg/kg)

[b] Radioactivity on chromatograms not assigned to any discrete component

Table 16 Characterisation of the radioactive residue in wheat straw treated with [pyrimidinyl-^{14}C]azoxystrobin at BBCH 71

Compounds detected (free and conjugated) and fractions characterized	% TRR	mg/kg
Azoxystrobin	50.6	1.28
Compound 2	1.8	0.046
Compound 9	2.9	0.073
Compound 24	2.9	0.073
Compound 28	2.2	0.056
Compound 35	1.5	0.038
Compound 42	0.8	0.020
Unidentified compounds[a]	6.2	0.156
Polar compounds	4.2	0.107
Aqueous methanol soluble radioactivity	1.0	0.026
Unextracted radioactivity	15.2	0.385
Losses during work-up	4.0	0.101
Remainder[b]	6.7	0.170
Total	100	2.53

[a] All the individual components were < 1.1% of the TRR (i.e. none > 0.028 mg/kg)

[b] Radioactivity on chromatograms not assigned to any discrete component

Grapes

A field study was carried out in Southern France in 1992 to determine the uptake and metabolism of radiolabelled azoxystrobin in grape vines (Earl and Hadfield, 1994, RJ1676B). Azoxystrobin, separately labelled as either [cyanophenyl-^{14}C], [pyrimidinyl-^{14}C] or [phenylacrylate-^{14}C]

azoxystrobin was applied as a 250 SC formulation to three grape vines (one vine for each radiolabel). Azoxystrobin was applied as a foliar spray four times with application rates of 0.25, 1.0, 1.0, and 0.25 kg ai/ha. Grapes and leaves were harvested 21 days after the last application. Grapes were separated into juice and pulp and the pulp was extracted with acetonitrile, acetonitrile/water and water. The extracts and juice were fractionated by liquid/liquid partition and solid phase extraction. The fractions were analysed by TLC and radioactive regions located by autoradiography and bio-imaging analysis. HPLC was used to isolate metabolites for MS analysis. Enzymes were used to extract bound residues and to hydrolyze conjugated metabolites.

Table 17 summarizes the characterization of the radioactive residues in grapes. The total radioactive residues in grapes were found to be 0.38 mg/kg from the cyanophenyl, 1.4 mg/kg from the pyrimidinyl, and 0.95 mg/kg from the phenylacrylate-labelled azoxystrobin treatments. The major residue for each radiolabel was the parent, azoxystrobin (35–65% TRR, equivalent to 0.13–0.92 mg/kg). In addition, the metabolism of azoxystrobin in grape vines showed a complex pathway with at least 15 metabolites present at low levels.

Table 17 Characterization of the radioactive residues in treated grapes

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	34.6	0.132	64.6	0.924	56.3	0.535
Compound 2	0.8	0.003	0.4	0.006	0.4	0.004
Compound 9	2.3	0.009	1.9	0.027	4.0	0.038
Compound 13	5.7	0.022	NP[a]	NP[a]	NP[a]	NP[a]
Compound 19	0.7	0.003	0.6	0.009	0.4	0.004
Compound 24	3.9	0.015	2.5	0.036	2.9	0.028
Compound 28	5.2	0.020	2.6	0.037	NP[a]	NP[a]
Compound 35	2.3	0.009	1.2	0.017	0.9	0.009
U5[b]	0.7	0.003	0.6	0.009	0.3	0.003
Glucose[c]	2.3	0.009	2.2	0.031	1.4	0.013
Fructose[c]	3.2	0.012	2.5	0.036	2.0	0.019
Sucrose[c]	ND[d]	ND[d]	ND[d]	ND[d]	0.4	0.004
Unidentified compounds[e]	15.3	0.058	8.7	0.124	14.0	0.133
Remainder[f]	4.6	0.018	4.2	0.060	3.4	0.032
Organo-soluble radioactivity	0.6	0.002	0.4	0.006	0.6	0.006
Water-soluble radioactivity	5.8	0.022	1.2	0.017	3.5	0.033
Total[g]	100.6	0.384	99.1	1.42	101.5	0.965

[a] Not present with this radiolabel position

[b] Structure tentatively assigned from mass spectral analysis

[c] This results from the incorporation of $^{14}CO_2$ (generated by degradation in the soil) into these sugars

[d] Not detected

[e] All the individual components were < 5% of the TRR (i.e. none > 0.072 mg/kg)

[f] Radioactivity on chromatograms not assigned to any discrete component

[g] Differences from 100% result from losses/gains in the concentration of fractions prior to TLC analysis

A total of nine metabolites were identified and the most significant were Compound 13 (5.7% TRR, 0.022 mg/kg), Compound 28 (2.6–5.2% TRR, 0.020–0.037 mg/kg), Compound 9 (1.9–4.0% TRR, 0.09–0.038 mg/kg), and Compound 24 (2.5–3.9% TRR, 0.036–0.015 mg/kg). Compound 13 is formed by diphenyl ether cleavage between the cyclophenyl and pyrimidinyl rings of Compound 28. Two more unknown metabolites, Compounds U3 and U5, were characterized by MS. Compounds U3

and U5 are probably formed by oxidative cleavage or reduction of the acrylic bond of the free acrylic acid, Compound 2.

Incorporation of radioactivity into naturally occurring sugars indicated mineralization of [^{14}C]azoxystrobin in soil, with subsequent assimilation of $^{14}CO_2$. This radiolabelled carbon dioxide being taken up by the plant results in the formation of [^{14}C]sugars via photosynthesis. The sugars, characterized by HPLC were identified as glucose, fructose, and sucrose.

Enzyme hydrolysis showed that some of the polar compounds were conjugates of known metabolites. No new metabolites could be detected after hydrolysis. In addition to the parent compound, the other metabolites released by enzyme hydrolysis were Compounds 13 and 28. The overall levels of total identified radioactive residues were 59%, 77% and 68% for [cyanophenyl-^{14}C], [pyrimidinyl-^{14}C] and [phenylacrylate-^{14}C]azoxystrobin, respectively. The remaining individual unknown components were all below 5% TRR (0.072 mg/kg azoxystrobin equivalent).

Peanuts

A study was carried out between 1993 and 1994 to determine the uptake and metabolism of azoxystrobin in peanut vines grown under field conditions in the USA (Webb *et al.,* 1995, RJ1807B). [^{14}C]azoxystrobin formulated as a 250 g ai/L suspension concentrate, separately labelled in either the cyanophenyl, pyrimidinyl or phenylacrylate ring, was applied as a foliar spray to peanut vines. Each plant received two foliar applications at a rate of 0.85 kg ai/ha (0.17 kg ai/hL), 53 and 95 days after planting and one application at a rate of 0.3 kg ai/ha (0.06 kg ai/hL) at day 144. The total seasonal application rate was 2 kg ai/ha. Ten days after the last application, the plants were lifted and approximately 50% of the vines were stored fresh. The remaining vines and pods (nuts and hulls intact) were left to dry in the sun for four days. The dried crop was then separated into nuts, hulls (shells) and hay (dried vine) and analysed. Table 18 shows TRR found in the collected samples for each radiolabel.

Table 18 Total radioactive residues in each of the peanut analytes

Position of Radiolabel	Total Radioactive Residue (mg/kg)			
	Nut	Hull	Hay	Vine
Cyanophenyl	0.24	0.71–0.75	40.2–44.9	15.5–17.4
Pyrimidinyl	0.60–0.65	0.87–0.90	39.2–46.2	16.4–20.8
Phenylacrylate	0.47–0.49	0.67–0.68	46.0–46.6	19.6–21.4

The most significant residues identified in the nut were the fatty acids, oleic and linoleic, accounting for 28–32% TRR (0.074–0.21 mg/kg) and 11–16% (0.27–0.11 mg/kg), respectively. Natural incorporation of radioactivity into sugars was identified by HPLC analysis, indicating mineralization of [^{14}C]azoxystrobin in soil with subsequent assimilation of $^{14}CO_2$. This radiolabelled carbon dioxide is taken up by the plant with subsequent formation of the [^{14}C] sugars via photosynthesis. HPLC analysis identified sucrose (1.7–5.6% TRR, 0.004–0.027 mg/kg), glucose (1.5–1.9% TRR, 0.005–0.010 mg/kg), and fructose (1.4–2.2%TRR, 0.005–0.012 mg/kg). The presence of radiolabelled glutamic acid was also confirmed. Parent azoxystrobin was not detected in the nut and no individual metabolite was present at a level greater than 1.0% (0.002 mg/kg). In total, 49–55% TRR (0.118–0.369 mg/kg) was identified and an additional 3.9–6.2% (0.015–0.038 mg/kg) remained unextracted following both solvent extraction and enzyme hydrolysis. All radioactive residues in the nut are listed in Table 19**.**

Table 19 Characterization of the radioactive residues in treated peanut nut

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Compound 3	NP[a]	NP[a]	< 0.1	< 0.001	0.1	< 0.001

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Compound 13	0.3	0.001	NP[a]	NP[a]	NP[a]	NP[a]
Compound 36	0.1	< 0.001	< 0.1	< 0.001	0.1	< 0.001
Compound 42	1.0	0.002	0.3	0.002	NP[a]	NP[a]
Oleic Acid	30.9	0.074	32.3	0.210	27.5	0.135
Linoleic Acid	11.2	0.027	16.3	0.106	16.2	0.079
Sucrose	1.7	0.004	2.5	0.016	5.6	0.027
Glucose	1.9	0.005	1.6	0.010	1.5	0.007
Fructose	2.2	0.005	1.9	0.012	1.4	0.007
Characterized Sugars / Amino Acids [b]	15.1	0.036	13.9	0.090	12.4	0.061
Unknowns [c] (None >)	7.9 (2.3)	0.019 (0.006)	2.6 (0.3)	0.017 (0.002)	5.2 (0.7)	0.025 (0.003)
Remainder [d]	13.1	0.031	8.7	0.057	13.3	0.065
Filter Papers	0.8	0.002	0.7	0.004	0.7	0.003
Methanol (Debris)[e]	3.2	0.008	2.1	0.014	2.6	0.013
Aqueous (Hexane) [f]	2.4	0.006	2.3	0.015	2.4	0.012
Debris	6.2	0.015	5.8	0.038	3.9	0.019
Fractionation Losses	2.0	0.005	9.0	0.059	7.3	0.036
Balance [g]	0.0	0.0	0.0	0.0	–0.2	–0.001
Total	100.0	0.24	100.0	0.65	100.0	0.49

[a] Not present with this radiolabel position

[b] This fraction sums the radioactivity from further extraction of the debris, which was characterized as natural incorporation of radioactivity into simple sugars and amino acids by HPLC. In addition, a subsample of the debris from the [^{14}C]pyrimidinyl labelled treatment was base hydrolysed and IsBOC derivatised to give an organic fraction which when analysed by TLC enabled the identification of naturally incorporated radioactivity as glutamic acid (3.7% TRR, 0.024 mg/kg)

[c] The sum of unknowns detected in the extracted organosoluble radioactivity, the level of the largest individual component of these unknowns is shown in parenthesis.

[d] The sum of streaking and unassigned activity on the TLC plates as well as losses from the HPLC columns.

[e] The methanol (debris) fraction resulted from a tC18 bond elut column that was run on the hydrolysate produced from enzyme hydrolysis of the unextractable material.

[f] The aqueous (hexane) fraction resulted from saponification of the hexane fraction, followed by partitioning with diethyl ether.

[g] The differences between the sum of the identified/characterized radioactivity and the total radioactive residue (TRR) and were accounted for by the calculation of mean % TRR values, remainder and baseline values.

In hulls, the major component of the radioactive residue was the parent, azoxystrobin (13–14% TRR, 0.088–0.11 mg/kg). A total of 11 metabolites were identified, the most significant of which were Compound 28 (2.5–2.6% TRR, 0.020–0.022 mg/kg) and Compound 42 (1.2–1.9% TRR, 0.010–0.014 mg/kg). No other residue component was greater than 1.6% TRR (0.012 mg/kg). In total, 20–26% (0.137–0.193 mg/g) of the radioactive residue was identified and a further 5.4–14% TRR (0.041–0.121 mg/kg) remained unextracted following both solvent extraction and alkali hydrolysis. All radioactive metabolites detected in the hull are summarized in Table 20.

Table 20 Characterization of the radioactive residues in treated peanut hull

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	13.5	0.101	12.5	0.109	12.9	0.088
Compound 9	1.2	0.009	1.0	0.009	1.2	0.008
Compound 13	1.6	0.012	NP[a]	NP[a]	NP[a]	NP[a]
Compounds 28, 41 and 42[b]	5.5	0.041	4.5	0.034	NP[a]	NP[a]
Compound 30	0.5	0.004	0.5	0.004	1.5	0.010
Compound 35	0.5	0.004	0.6	0.005	1.5	0.010
Compound 24	0.6	0.005	0.5	0.004	0.7	0.005
Compound 19	0.9	0.007	0.5	0.004	0.7	0.005
Compound 2	0.9	0.007	0.9	0.008	1.1	0.007
U13	0.5	0.004	0.4	0.003	0.6	0.004
Glucose	0.7	0.005	1.6	0.014	2.8	0.019
Other Sugars	1.2	0.009	3.4	0.030	4.0	0.027
Unknowns[c] (None >)	9.2 (2.3)	0.069 (0.017)	6.9 (1.9)	0.060 (0.017)	14.7 (2.3)	0.100 (0.016)
Remainder[d]	12.3	0.098	10.4	0.090	8.1	0.055
Organic (Debris)[e]	6.7	0.050	4.4	0.038	4.1	0.028
Aqueous (Debris)[e]	3.9	0.029	4.8	0.042	3.7	0.025
Aqueous (Debris)[f]	0.8	0.006	1.5	0.013	1.6	0.011
5% Aqueous Methanol (Debris)[g]	13.9	0.104	15.8	0.137	14.2	0.097
Methanol (Debris)[g]	1.7	0.013	3.7	0.032	3.3	0.022
Debris	5.4	0.041	13.9	0.121	11.7	0.080
Fractionation Losses	14.2	0.102	10.3	0.093	11.3	0.072
Balance[h]	4.5	0.034	1.9	0.017	0.3	0.002
Total	100.2	0.75	100.0	0.87	100.0	0.68

[a] Not present with this radiolabel position

[b] Compounds 28, 41 and 42 were grouped together since Compounds 41 and 42 are conjugated metabolites of Compound 28. Their individual residues were 2.6% TRR (0.020 mg/kg) for Compound 28, 1.0% TRR (0.008 mg/kg) for Compound 41 and 1.9% TRR (0.014 mg/kg) for Compound 42 in the cyanophenyl labelled treatment. For the pyrimidinyl labelled treatment, their individual residues were 2.5% TRR (0.022 mg/kg) for Compound 28, 0.8% TRR (0.007 mg/kg) for Compound 41 and 1.2% TRR (0.010 mg/kg) for Compound 42.

[c] This is the sum of unknowns detected in the extracted organosoluble radioactivity; the level of the largest individual component of these unknowns is shown in parenthesis

[d] The sum of streaking and unassigned activity on the TLC plates as well as losses from the HPLC columns.

[e] Fractions resulting from partition of the aqueous filtrate following 0.1 M base hydrolysis of the debris.

[f] This fraction resulted from enzyme hydrolysis performed on the debris from a 5 M base hydrolysis.

[g] The 5% aqueous methanol (debris) and methanol (debris) fractions resulted from a C18 bond elut column run on the hydrolysate from a 5M base hydrolysis of the debris. The 5% aqueous methanol (debris) fractions were not further analysed. However, analysis of similar fractions in the nut, hay and indeed hull have shown that the activity associated with these fractions as being characteristically natural incorporation of radioactivity as simple sugars and/or amino acids.

[h] The balance values represent the differences between the sum of the identified/characterized radioactivity and the total radioactive residue (TRR) and were accounted for by the calculation of mean % TRR values, remainder and baseline values (i.e., the mean of more than one TLC solvent system).

In hay, the most significant residue was the parent, azoxystrobin (33–44% TRR, 13–20 mg/kg). Ten metabolites were identified; the most significant of which were Compound 28 (3.9%

TRR, 1.5–1.6 mg/kg) and Compound 42, a simple sugar conjugate of Compound 28, at a level of 2.9–5.1% TRR (1.1–2.1 mg/kg). The next most significant metabolites were Compound 13 in both the free and conjugated forms, present at 6.3% TRR (2.53 mg/kg) and Compound 9, present at 2.4–2.8% TRR (0.97–1.3 mg/kg). No other residue component was greater than 2.3% TRR, (0.93 mg/kg). In total, 51–57% (20–25 mg/kg) of the total radioactive residue was identified and a further 3.3–6.3% (1.3–2.5 mg/kg) remained unextracted following both solvent extraction and alkali hydrolysis. The characterization of the radioactive residues in hay is summarized in Table 21. The nature of the residue in the vine was shown to be qualitatively similar to that in the hay; therefore, further detailed analysis was not carried out.

Table 21 Characterization of the radioactive residues in treated peanut hay

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	33.0	13.3	34.4	13.5	43.8	20.4
Compound 9	2.4	0.965	2.8	1.10	2.8	1.30
Compound 13 and 40 [b]	6.3	2.53	NP[a]	NP[a]	NP[a]	NP[a]
Compound 28 and 42 [c]	9.0	3.62	6.9	2.70	NP[a]	NP[a]
Compound 30	1.9	0.764	2.2	0.862	2.0	0.932
Compound 35	1.3	0.523	1.7	0.666	1.9	0.885
Compound 24	1.3	0.523	1.5	0.588	1.5	0.699
Compound 19	1.0	0.402	1.1	0.431	1.2	0.559
U13	0.8	0.322	2.3	0.902	1.1	0.513
Unknowns [d] (None >)	9.7 (1.5)	3.90 (0.603)	11.2 (1.4)	4.39 (0.549)	12.7 (1.5)	5.92 (0.699)
Remainder [e]	17.0	6.83	19.9	7.80	16.8	7.83
5% Aqueous Methanol[f]	2.2	0.884	6.2	2.43	5.4	2.52
Debris	3.3	1.33	6.3	2.47	3.7	1.72
Fractionation Losses	6.9	2.77	1.3	0.510	4.6	2.14
Balance [g]	3.9	1.57	2.2	0.862	2.5	1.17
Total	100.0	40.2	100.0	39.2	100.0	46.6

[a] Not present with this radiolabel position

[b] Compounds 13 and 40 were grouped together since Compound 40 is a conjugated metabolite of Compound 13. Their individual residues were 2.4% TRR (0.97 mg/kg) for Compound 13 and 3.9% TRR (1.6 mg/kg) for Compound 40.

[c] Compounds 28 and 42 were grouped together since Compound 42 is a conjugated metabolite of Compound 28. Their individual residues were 3.9% TRR (1.6 mg/kg) for Compound 28 and 5.1% TRR (2.1 mg/kg) for Compound 42 in the cyanophenyl labelled treatment. For the pyrimidinyl labelled treatment, their individual residues were 4.0% TRR (1.6 mg/kg) for Compound 28 and 2.9% TRR (1.1 mg/kg) for Compound 42.

[d] The sum of unknowns detected in the extracted organosoluble radioactivity, the level of the largest individual component of these unknowns is shown in parenthesis.

[e] The sum of streaking and unassigned activity on the TLC plates as well as losses from the HPLC columns.

[f] The activity associated with the 5% aqueous methanol fractions was mainly characterized as natural incorporation of radioactivity into simple sugars (1.4–4.8% TRR, 0.54–2.2 mg/kg).

[g] The differences between the sum of the identified/characterized radioactivity and the total radioactive residue (TRR) and were accounted for by the calculation of mean % TRR values, remainder and baseline values.

Rice

A study was carried out in the United Kingdom under greenhouse conditions in 1994 to determine the metabolism of radiolabelled azoxystrobin in rice through both foliar and root uptake (Joseph *et al.,* 1994, RJ1861B). The study consisted of two separate experiments; one with a single foliar spray and the other with two granular paddy applications. For the foliar spray, azoxystrobin was applied

formulated as a suspension concentrate labelled separately in each of the three rings. Rice plants were treated just after heading at rates equivalent to a total field application of 0.36–0.55 kg ai/ha. For the paddy application, the compound was formulated as a granular product labelled separately in each of the three rings. Two applications were made to the paddy water to give a total seasonal application rate of 1.73–1.92 kg ai/ha. The applications were at 11–13 days after transplanting rice plants at the three-leaf stage, and again after a further 36 days, just prior to heading.

Crops were harvested at maturity after a pre-harvest interval of 75–95 days for the foliar-treated plants and a PHI of 95–98 days after the second application for the granular treated rice plants. Grain and straw samples were analysed, using similar methods as for the wheat metabolism study. The distribution of the radioactivity in rice plants is summarized in Table 22, with the majority of the residue found in rice straw.

Table 22 Total radioactive residues in rice grain and straw

Sample		Cyanophenyl label (mg/kg)	Pyrimidinyl label (mg/kg)	Phenylacrylate label (mg/kg)
Grain	Granular	0.61	0.53	0.74
	Foliar	0.40	0.34	0.32
Straw	Granular	8.2	10.5	9.1
	Foliar	5.7	7.8	7.7

In rice grain, the only significant residues from the granular application (Table 23) were radiolabelled sugars (43–58% TRR) and the parent compound (3.4–5.3% TRR). Similarly, the foliar application resulted mainly in the residues of the parent (36–72% TTR) and radiolabelled sugars (4.9–17% TRR), see Table 24.

Table 23 Characterization of the radioactive residues in rice grain (granular application)

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	3.4	0.021	5.3	0.028	3.4	0.024
Compound 3	ND	ND	2.8	0.015	1.8	0.013
Compound 9	ND	ND	0.3	0.002	ND	ND
Compound 23	ND	ND	0.6	0.003	0.7	0.005
Compound 28	0.8	0.005	0.6	0.003	ND	ND
Sugars	57.9	0.351	43.2	0.228	48.1	0.358
Polar material in TLC	5.4	0.033	16.0	0.084	6.3	0.045
Unknowns	26.7	0.152	10.9	0.058	25.6	0.187
Unextracted residue	6.7	0.041	12.8	0.067	10.6	0.079
Fractionation loss/gain	0.9	0.005	–7.5	0.040	–3.5	–
Total	100	0.608	100	0.528	100	–

ND=not detected

Table 24 Characterization of the radioactive residues in rice grain (foliar application)

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	63.8	0.256	36.3	0.123	71.5	0.230
Compound 9	4.2	0.017	3.3	0.011	4.3	0.014
Compound 24	1.0	0.004	ND	ND	ND	ND
Compound 28	4.6	0.018	3.3	0.011	ND	ND
Compound 35	1.3	0.005	ND	ND	1.1	0.004
Sugars	4.9	0.019	16.5	0.0566	5.1	0.017
Polar material in TLC	2.8	0.11	11.5	0.039	2.6	0.008
Unknowns	15.7	0.063	14.5	0.049	17.3	0.056
Unextracted residue	3.6	0.014	5.7	0.019	2.6	0.008
Fractionation loss/gain	1.9	0.008	–8.9	0.030	4.5	0.014
Total	100	0.399	100	0.338	100	0.323

ND=not detected

In rice straw, the major components from the granular application (Table 25) were the parent (3.3–5.6 % TRR), Compounds 22/23 (5.1–8.1 %TRR) and Compound 2 (3.6–6.7% TRR). In foliar application (Table 26), the parent, azoxystrobin, was the single most abundant component (38–46% TRR), followed by Compound 28 (5.2–8.5% TRR). Similarly to rice grain, a portion of the radioactivity was identified as radiolabelled sugars (1.9–3.9% TRR and 1.1–1.8% TRR for granular and foliar applications, respectively). The presence of radioactivity in these natural products is a result of mineralization of azoxystrobin in soil and subsequent assimilation and incorporation of the $^{14}CO_2$ into natural products via photosynthesis.

Table 25 Characterization of the radioactive residues in rice straw (granular application)

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	5.1	0.416	5.6	0.586	3.3	0.300
Compound 2	6.7	0.547	3.6	0.377	4.8	0.437
Compound 3	NA	NA	4.0	0.419	2.5	0.228
Compound 9	1.3	0.106	0.7	0.073	1.3	0.118
Compound 10	NA	NA	1.6	0.168	0.3	0.027
Compound 19	ND	ND	0.8	0.084	ND	ND
Compound 20	ND	ND	1.2	0.126	ND	ND
Compound 24	1.4	0.114	0.8	0.084	1.2	0.109
Compound 28	3.2	0.261	3.0	0.314	NA	NA
Compound 30	2.6	0.212	2.5	0.262	2.6	0.237
Compound 35	0.4	0.033	2.0	0.209	2.1	0.191
Compound 22/23	5.1	0.416	7.7	0.806	8.1	0.737
Sugars	3.0	0.245	1.9	0.199	3.9	0.355
Polar material in TLC	3.0	0.245	9.6	1.01	9.1	0.828
Unknowns	42.7	3.48	33.9	3.55	37.3	3.40
Unextracted fraction 6	2.1	0.171	1.2	0.126	2.9	0.264
Unextracted residue	6.2	0.506	6.7	0.701	8.9	0.808

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Particulate fraction	1.9	0.155	NA	NA	1.0	0.091
Fractionation losses	15.3	1.25	13.2	1.38	10.7	0.974
Total	100	8.16	100	10.47	100	9.10

NA=no analysis done

ND=not detected

Table 26 Characterization of the radioactive residues in rice straw (foliar application)

Compounds detected (free and conjugated) and fractions characterized	Position of radiolabel					
	Cyanophenyl		Pyrimidinyl		Phenylacrylate	
	%TRR	mg/kg	%TRR	mg/kg	%TRR	mg/kg
Azoxystrobin	40.2	2.30	37.6	2.94	45.9	3.54
Compound 2	0.7	0.040	1.1	0.086	0.6	0.061
Compound 3	ND	ND	0.9	0.070	4.2	0.324
Compound 9	3.5	0.200	0.70	0.055	3.0	0.232
Compound 10	ND	ND	0.40	0.031	0.70	0.054
Compound 19	ND	ND	0.80	0.062	ND	ND
Compound 24	1.7	0.097	1.4	0.109	2.2	0.170
Compound 28	5.2	0.297	8.5	0.664	ND	ND
Compound 30	1.6	0.091	2.0	0.156	1.7	0.131
Compound 35	2.4	0.137	1.6	0.125	2.3	0.178
Compound 22/23	0.6	0.034	1.1	0.086	0.9	0.069
Sugars	1.7	0.097	1.1	0.086	1.8	0.139
Polar material in TLC	2.0	0.114	4.1	0.320	1.3	0.100
Unknowns	19.2	1.09	28.6	0.812	20.1	1.55
Unextracted fractions 5/ 6	NA	NA	2.4	0.187	NA	NA
Unextracted residue	14.2	0.811	3.4	0.265	12.7	0.980
Fractionation losses	7.0	0.400	4.3	0.336	2.3	0.178
Total	100	5.71	100	7.81	100	7.72

NA=no analysis done

ND=not detected

Cotton

A study was carried out in 1997–1998 in the USA to determine the metabolism of radiolabelled azoxystrobin in cotton after an in-furrow application of azoxystrobin (Panel *et al.,* 1990, RJ2695B). [Pyrimidinyl-^{14}C]azoxystrobin was formulated as a suspension concentrate formulation and applied to cotton at planting as an in-furrow application at a rate of 18 g ai per km (0.19 oz ai per 1000 ft row). Approximately half of the cotton was harvested immature as forage, while the remainder was allowed to reach maturity. The mature cotton was separated into seed, lint, and gin trash. The total radioactive residues in cotton are summarized in Table 27.

Table 27 Total radioactive residues in cotton samples

Samples	Radioactive residue, mg/kg azoxystrobin equivalent			
	By direct quantification of sample		By summation of extracts and debris radioactivity	
	Treated	Control	Treated	Control
Seed	0.005	0.005	0.006	0.004
Forage	0.081	0.0002	0.085	0.0002
Lint	0.004	0.003	NA	NA
Gin trash	NA	NA	0.007	0.003

NA=no analysis done

Characterization of the residues was not carried out in seed, lint, and gin trash, in which the TRR were < 0.01 mg/kg. An attempt was made to characterize the residues in forage, in which the total radioactive residue was 0.085 mg/kg. The results are summarized in Table 28. The most significant residue in the forage was the parent, representing 15% TRR (0.013 mg/kg). At least eight unknowns were detected, not one representing > 0.01 mg/kg of parent equivalent. None of the unknowns co-chromatographed with any of the applied reference substances. To further characterize the radioactive residues, the forage extract was partitioned with diethyl ether at pH 6–7 and then ethyl acetate at pH 1–2. All partitioned fractions were quantified by LSC and analysed by TLC. The presence of azoxystrobin was confirmed by HPLC.

Table 28 Characterization of the radioactive residues in cotton forage

Component	% TRR	Azoxystrobin equivalent (mg/kg)
Azoxystrobin	15	0.013
Unknown 1	1.7	0.001
Unknown 2	11	0.010
Unknown 3	3.4	0.003
Unknown 4	2.8	0.002
Unknown 5	7.4	0.006
Unknown 6	5.0	0.004
Unknown 7	5.5	0.005
Unknown 8	6.3	0.005
Polar material in TLC	1.7	0.001
Remainder	16	0.013
Debris	20	0.017
Filters	0.3	< 0.001
Losses	3.9	0.004
Total	100	0.085

Proposed metabolic pathway in plants

The metabolism of azoxystrobin in wheat, rice, grapes, peanut vines and cotton was very similar, with the parent, azoxystrobin, being the major component of the residue. In peanut nuts, fatty acids (oleic and linoleic) accounted for most of the TRR. In cotton, no significant residues were detected in cottonseed.

The proposed metabolic pathway for azoxystrobin in plants is shown in Figure 2. The metabolism of azoxystrobin was complex, resulting in the formation of many metabolites, the most

common being Compound 28, which was present at levels of up to 10% of TRR in wheat straw, 9% in peanut hay, 8.5% in rice straw, 4.6% in rice grain, and 5.7% in grapes. Levels of compound 28 in wheat grain and nuts were < 3% and < 1%, respectively. Compound 13, another significant metabolite, was present at 5.7% of TRR in grapes and 6.3% of TRR in peanut hay. Both Compound 28 and Compound 13 are structurally dissimilar to the parent and are animal metabolites.

Compounds 22 and 23 which are isomers of hydroxylated azoxystrobin, were found only in rice straw at levels of 8.1% TRR, following granular applications, The rest of the metabolites (Compounds 2, 9, and 24) were present at levels < 4% of TRR in all commodities. In most of the studies, a significant portion of the radioactivity was identified as radiolabelled natural products such as sugars, starch, fatty acids, and amino acids. The presence of radioactivity in these natural products is believed to result from the mineralization of azoxystrobin in soil and subsequent incorporation of $^{14}CO_2$ via photosynthesis.

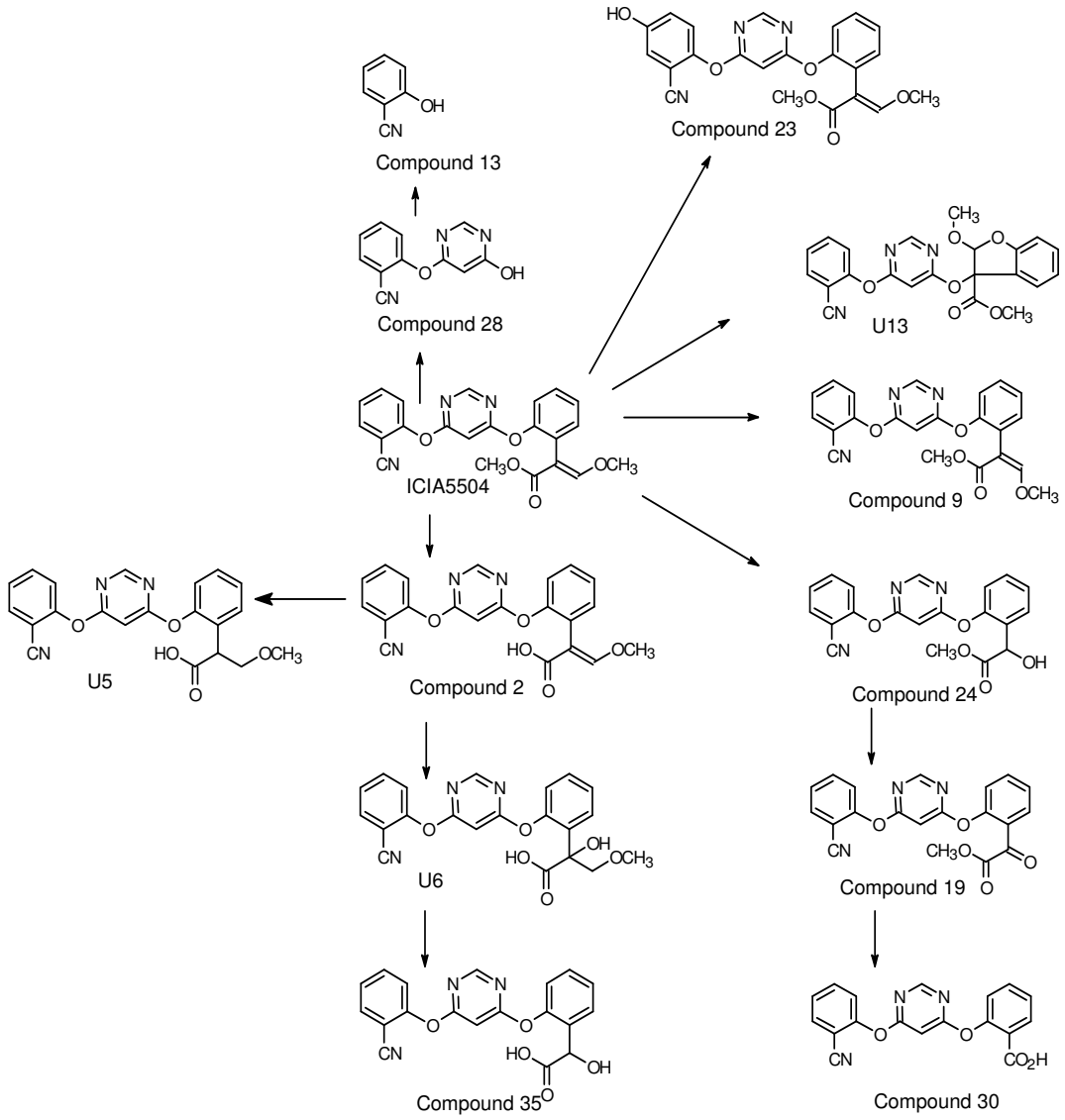


Figure 2 Proposed metabolic pathway of azoxystrobin in plants.

Environmental fate in soil

The Meeting received information on aerobic and anaerobic degradation of azoxystrobin in soil; photolysis on soil surface; mobility in soil; field dissipation studies performed in the Northern and Southern Europe; and azoxystrobin residues in rotational crops.

Aerobic and anaerobic degradation

The Meeting received two studies on the aerobic and anaerobic metabolism of [^{14}C]azoxystrobin (labelled separately in the pyrimidinyl, cyanophenyl and phenylacrylate rings). In the first study (Mason and Butters, 1994, RJ1754B), the metabolism of labelled azoxystrobin was studied in a sandy loam soil for a period of 360 days. Azoxystrobin was applied to the surface of the soil with an initial concentration equivalent to an application rate of between 2.7 and 3.7 kg ai/ha. This application rate is more than ten times the single maximum application rate for most crops in the USA and Europe. The treated soil, maintained at 40% moisture holding capacity, was incubated separately in the dark under aerobic, anaerobic and sterile conditions at 20 °C and also under aerobic conditions at 5 °C.

Under aerobic conditions at 20 °C, azoxystrobin degraded with a mean half-life of 279 days, with 24–42% azoxystrobin remaining after 360 days. At 5 °C, 77% azoxystrobin was recovered over the same time period. There was no significant degradation of azoxystrobin in the sterile treatment, which suggests that the aerobic degradation observed in the other treatments was due to microbial activity.

Table 29 shows composition of radioactive residue (mean values for the three radiolabels) obtained after 360 days at 20 °C. Two metabolites were detected in significant amounts—Compound 2, which accounted for 15–21% of the radioactivity after 360 days incubation and Compound 36, which reached 4.6–8.8% during the same time. No other degradation product was detected which accounted for more than 5% of the applied radioactivity.

Table 29 Radioactivity recovered from aerobic soil after incubation at 20 °C for 360 days

Radioactive Component	% of applied radioactivity (mean of 3 radiolabels)
Azoxystrobin	33
Compound 2	18
Compound 36	6.1
Polar compounds	1.6
Others	5.9
CO_2	12
Unextracted	21
Total	97

Under anaerobic conditions (Table 30), degradation of azoxystrobin was more rapid with a mean half-life of 181 days and 25–33% remaining after 360 days. Compound 2 accounted for 48–51% of the radioactivity after 360 days incubation. Compound 36 was not detected.

Mineralization to CO_2 was significant with up to 14% detected after 360 days under aerobic conditions at 20 °C. At 5 °C, less than 2% CO_2 was recovered in the same time period. There was negligible CO_2 evolution from the anaerobic and sterile aerobic treatments. No other volatile compounds were observed during the course of the study.

Table 30 Radioactivity recovered from anerobic soil and surface water after 360 days

Radioactive Component	% of applied radioactivity (mean of 3 radiolabels)
Azoxystrobin	28
Compound 2	49
Others	4.6
Unextracted	12
Total	94

In the second study (Warinton *et al*., 1995, RJ1801B), the aerobic metabolism of [^{14}C]azoxystrobin was studied in two UK soils, a silt loam and a sandy clay loam, and a sandy loam soil from the USA. The UK soils were treated with [^{14}C]azoxystrobin separately labelled in each of the three aromatic rings, while the USA soil was treated with [^{14}C]azoxystrobin labelled in the pyrimidyl ring only. Radiolabelled azoxystrobin was incorporated into the soil with an initial concentration equivalent to an application rate of 0.56 kg ai/ha. The treated UK soils, maintained at 75% of 1/3 bar moisture, were incubated separately in the dark under aerobic and anaerobic conditions at 20 °C for up to 120 days. The sandy loam soil from the USA was incubated under aerobic conditions only.

Under aerobic conditions, azoxystrobin degraded with DT_{50} values of about 56 and 84 days in the two UK soils. Degradation in the US soil was slower with a projected DT_{50} of about 160 days. This difference was attributed to the much lower microbial biomass in this soil. The only major metabolite was Compound 2, which accounted for up to 20% of the applied radioactivity during the initial rapid decline in azoxystrobin concentration, up to 62 days after application in the UK soils. However, Compound 2 was a relatively short-lived metabolite in aerobic soils, with an estimated half-life in soil of less than two weeks. No other product was detected which accounted for more than 5% of the applied radioactivity at any time (see Table 31 for results obtained after 120 days).

Table 31 Radioactivity recovered from aerobic soil after 120 days

Radioactive Component	% of applied radioactivity after 120 days (mean of 3 radiolabels)		
	Silt Loam (UK)	Sandy Clay loam (UK)	Sandy Loam (USA)
Azoxystrobin	31%	36%	55%
Compound 2	15%	9.5%	12%
Compound 3	0.5%	0.4%	3.1%
Compound 28	0.7%	1.0%	2.1%
Compound 36	1.6%	2.8%	0.4%
Polar compounds	1.9%	2.6%	1.0%
Others	3.3%	4.1%	5.7%
$^{14}CO_2$	24%	18%	1.8%
Unextracted	22%	22%	17%
Total	100%	96%	98%

The anaerobic metabolism study was only conducted on the UK soils by addition of azoxystrobin to the water. Degradation of azoxystrobin was more rapid with DT_{50} of about 49 and 56 days. Compound 2 accounted for 44–69% of the applied radioactivity after 120 days incubation (Table 32). Compounds 28, 3 and 36 were also detected at very low levels not exceeding 3% of the applied radioactivity.

Table 32 Radioactivity recovered from anaerobic soil after 120 days

Radioactive Component	% of applied radioactivity (mean of 3 radiolabels)	
	Silt Loam (UK)	Sandy Clay Loam (UK)
Azoxystrobin	18.7%	20.7%
Compound 2	57.2%	58.5%
Compound 3	0.0%	0.0%
Compound 28	3.3%	0.8%
Compound 36	0.0%	0.0%
Polar compounds	1.1%	1.2%
Others	4.7%	6.1%
$^{14}CO_2$	2.5%	2.1%
Unextracted	10.4%	5.9%
Total	97.9%	95.3%

Mineralization to CO_2 was significant with up to 27% detected after 120 days under aerobic conditions at 20 °C. Under anaerobic conditions, CO_2 evolution was greatly reduced and accounted for up to 5% of the applied radioactivity after 120 days. All the components shown are ultimately mineralised to CO_2 in soil in the dark.

Photolysis on soil surface

The Meeting received a study on photodegradation of azoxystrobin on a soil surface (Winter and Joseph, 1995, RJ1716B), in which [^{14}C]azoxystrobin (labelled separately in all three rings) was applied to thin (approximately 1 mm) layers of sandy loam soil at a rate equivalent to 0.5 kg ai/ha and irradiated for up to the equivalent of 30 days Florida summer sunlight.

Azoxystrobin underwent rapid degradation on the soil surface with a mean DT_{50} of 11 days Florida summer sunlight which is equivalent to 11.5 days summer sunlight at 50 °N. The degradation was complex, with many minor products formed, none of which were seen to build up with time. A total of nine photolysis products were identified, the most significant of which was Compound 9 (Z-isomer), which reached levels of up to 9% of applied radioactivity. Compounds 30 and 28 were also identified, with maximum levels of 7.5 and 5.7% of applied radioactivity, respectively. The remaining products were typically present at levels of 1 to 5% of the applied radioactivity. The only significant product (> 10% of applied radioactivity) was $^{14}CO_2$, from all three labels, reaching levels of up to 29% of applied radioactivity, which indicates complete mineralization of the compound.

Degradation under field conditions

Laboratory studies showed that both photolysis and microbial degradation were possible routes of degradation. A study was to carry out using [^{14}C]azoxystrobin to identify significant degradation products following application to soil under field conditions (Mason *et al.,* 1995*,* RJ1830B). [^{14}C]Azoxystrobin (labelled separately in all three rings) formulated as a suspension concentrate was applied to bare soil plots under field conditions in California, USA. The soil type was a sandy loam and it was the same as the one used in the second soil laboratory metabolism study (Warinton *et al*., 1995, RJ1801B). A single application was made to separate plots for each radiolabel at application rates equivalent to 536 to 589 g ai/ha. Soil samples were collected at intervals up to 45 cm depth (and at four months after treatment, samples were also taken to a depth of 100 cm). This trial was irrigated with an equivalent of 100 mm of rain per month. (As a comparison, the average rainfall for the same months in Northern Europe is 66 mm, based on 30 year averages).

[^{14}C]Azoxystrobin degraded rapidly under field conditions with a mean half-life of 14 days across the three plots. The major degradates under field conditions were Compounds 28 and 30, at

levels up to 8% (equivalent to 0.04 mg/kg) and 5% (equivalent to 0.05 mg/kg) of the applied radioactivity by 28 days after treatment, respectively. Four months after treatment, the levels of both degradates had decreased to 4.1% of the applied radioactivity. No other individual product accounted for more than 2% of the applied radioactivity during the four month period.

In the vast majority of analyses no radioactivity was detected below six inches (approximately 15 cm), demonstrating the low mobility of azoxystrobin and its degradates under field conditions. The total radioactive recovery declined throughout the four month study period ranging from 95–106% initially to between 13–23% from soil sampled four months after treatment. Azoxystrobin has been shown to mineralize to $^{14}CO_2$ via both photolytic breakdown on a soil surface and microbial metabolism in the soil, and the loss of $^{14}CO_2$ is therefore believed to be the cause of the decrease in recovery with time. Based on laboratory and field studies, the proposed overall degradation pathway for azoxystrobin in soil is shown in Figure 3.

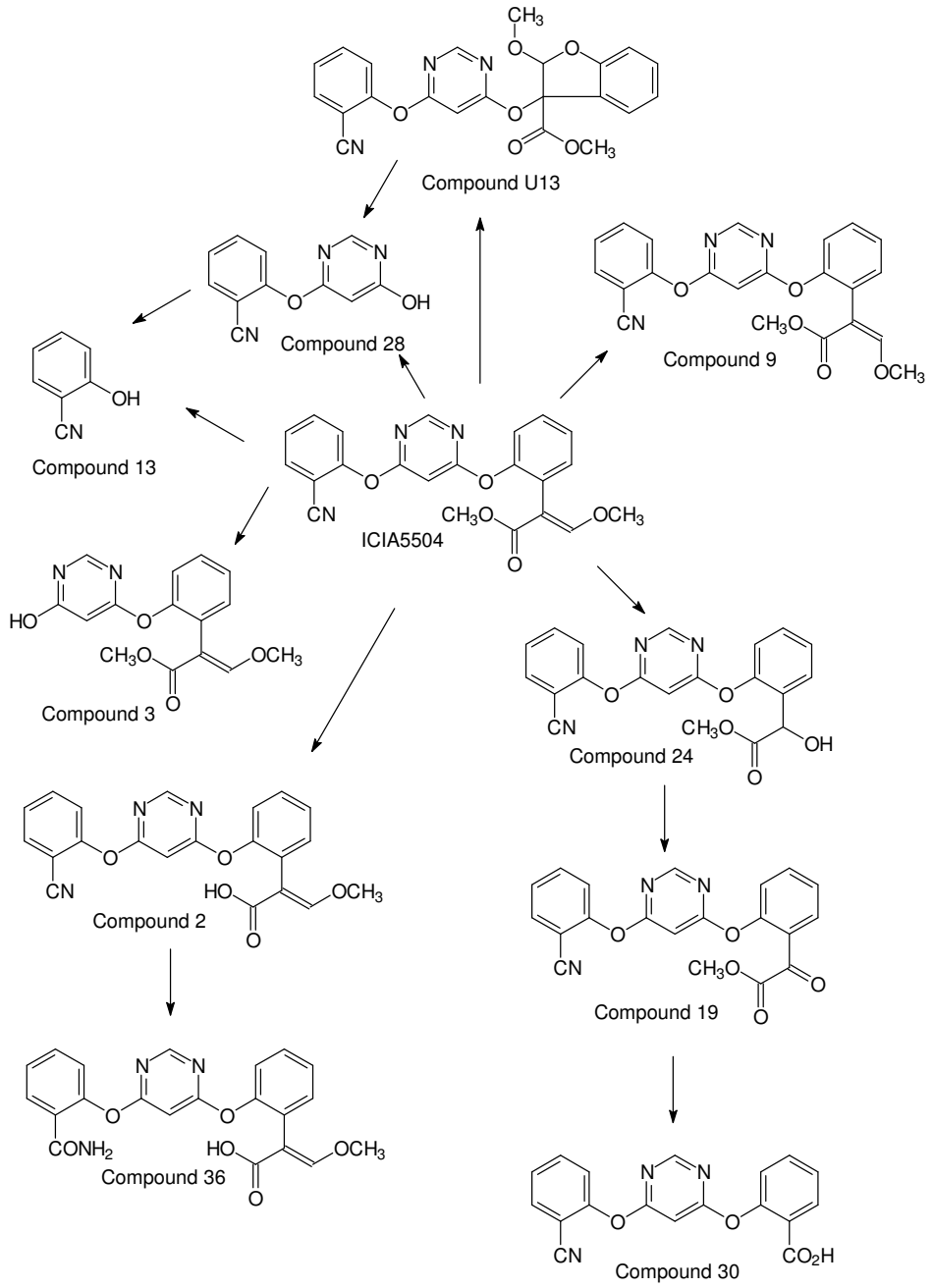


Figure 3 Proposed metabolic pathway of azoxystrobin in soil.

Mobility in soil

The adsorption and desorption properties of azoxystrobin were studied in six soils (two loamy sands, a sandy clay loam, a sand, a silty clay loam and a clay loam) (Rowe and Lane, 1994; RJ1541B). The pH of the soils ranged between 4.9 and 7.9. Azoxystrobin was added to a soil-water slurry at five rates of application (0.05, 0.1, 0.2, 0.4 and 0.8 μg/cm^3).

The adsorption of azoxystrobin in soil varied from moderate to strong, with average K_d values (adsorption coefficients) ranging from 2.1 in the sand (pH 5.4, 0.5% organic matter) to 20 in the clay loam (pH 5.5, 4.8% organic matter) (Table 33)**.** Freundlich adsorption coefficients (K') followed a similar pattern ranging from 1.5 to 15. The adsorption of azoxystrobin was shown to be directly related to soil organic matter content and to a lesser extent inversely related to pH. Average K_d values adjusted for soil organic carbon content (K_{oc} values) ranged from 300 in the alkaline loamy sand to 760 in the acidic silty clay loam, which gives a mean K_{oc} of 590. K' values similarly adjusted for organic matter content (K'_{oc}) ranged from 210 to 580.

In the desorption step, increases in K_d values ranged from 16–82%, which suggested that the adsorption of azoxystrobin was not entirely reversible. Based on the results, it can be concluded that azoxystrobin has medium to low potential mobility in soil based on the McCall Scale of Pesticide mobility in soil.

Table 33 Azoxystrobin adsorption coefficients in different types of soils

Soil Type	pH	% organic matter	K_d	K_{oc}
Loamy sand	7.9	5.1	9	300
Sandy clay loam	7.5	3.0	12	700
Loamy sand	7.8	2.9	6	360
Sand	5.5	0.5	2.1	710
Silty clay loam	4.9	2.8	12	760
Clay loam	5.5	4.8	20	720

A study on aged leaching in three soils was conducted using radiolabelled azoxystrobin (Butters and Mason, 1994; RJ1694B). [^{14}C]Azoxystrobin (separately labelled in all three rings) was applied to three soils (a sandy loam and two loamy sands, see Table 34) at a concentration ranging between 19 and 20 mg/kg soil. The treated soils were incubated in the dark between 19 and 24 °C under aerobic conditions at 40% moisture holding capacity for a period of 30 days. These samples were transferred to columns of the corresponding soil type to which water was applied at a rate equivalent to 200 mm of 'rain' over a period of approximately 48 hours.

Table 34 Characteristics of three soil samples in an aged leaching study of azoxystrobin

Soil Type	pH	% OM	Sand Content
Sandy loam	7.4	3.0	56
Loamy sand	6.3	1.1	88
Loamy sand	5.9	4.2	84

Following 30 days of incubation, up to 89% of the applied azoxystrobin was identified as parent compound, the remainder being unextracted material (up to 4.7%) and other extractable components (up to 3.5% at the 30 day interval with no single component > 1%). After the leaching period, 90% of the recovered radiocarbon remained in the top 5 cm, except for one of the loamy sand soils (pH 6.3, 1.1% organic matter), in which some movement of azoxystrobin was observed into the top 15 cm of the column. Less than 2% of the applied radioactivity was found in any of the leachates.

It can be concluded that azoxystrobin and its degradation products showed low mobility in soil under the conditions of this test.

Laboratory dissipation studies

A study was conducted to investigate the rate of degradation of azoxystrobin in three selected UK soils (sand, silty clay loam and sandy clay loam) under laboratory conditions (Tummon, 1995, RJ1819B). The soils were fortified with 0.25 mg/kg of azoxystrobin and maintained between 15 and 25 ºC, in the dark and at 40% of their moisture holding capacity for up to 127 days (see Table 35).

Azoxystrobin degraded in all three soil types under the conditions of the test with DT_{50} of 60, 94 and 57 days in the sand, silty clay loam and sandy clay loam soils, respectively. These data are in good agreement with the degradation rates determined from the second [^{14}C]azoxystrobin soil metabolism study (Warinton *et al*., 1995, RJ1801B).

Table 35 Dissipation of azoxystrobin in laboratory soils

Time (Days)	Mean azoxystrobin residue (mg/kg)		
	sand, pH 7.9	silty clay loam, pH 5.9	sandy clay loam, pH 6.4
0	0.26	0.25	0.25
4–6	0.24	0.24	0.25
13–14	0.23	0.18	0.21
22–23	ND	0.21	0.18
33–39	0.16	0.16	0.17
57–58	0.13	0.15	0.12
83–84	0.12	0.14	0.09
106–110	0.09	0.12	0.07
127	NA	0.10	NA

NA= no analysis done

ND=not detected

Field dissipation studies

Field soil dissipation studies were carried out between 1993 and 1995 in Northern Europe in Germany (Earl and Chamier, 1995; RJ1935B; and Earl and Kappes, 1995; RJ1946B), United Kingdom (Earl, *et al.*, 1995; RJ1940B and RJ1945B) and Northern France (Earl, *et al.*, 1995; RJ1938B). Similar trials were also conducted at the same time in Southern Europe in Italy (Earl, *et al.,* 1995; RJ1942B and RJ1944B) and Southern France (Earl, *et al.,* 1995; RJ1928B, RJ1941B and RJ1943B). All field dissipation studies applied a 250 SC formulation of azoxystrobin directly onto bare soil at a nominal rate of 750 g ai/ha. Soil samples were collected at intervals to a depth of 30 cm and analysed for azoxystrobin, Compound 9 (its major photolytic breakdown product on soil under laboratory conditions), Compound 2 (its major soil metabolite under laboratory conditions), and Compounds 28 and 30 (laboratory photolytic and radiolabelled field study metabolites).

Similar results were obtained from the different trials in Northern and Southern Europe. All trials showed that azoxystrobin is rapidly degraded under field conditions. No measurable residues of azoxystrobin were determined below 10 cm. No measurable residues of Compound 2 or Compound 9 were determined in any samples from any trials with the exception of detection of Compound 2 in one trial in Northern Europe (0.03 mg/kg) in 0–10 cm horizon. Residues of Compound 28 and 30 ranged between < 0.01–0.03 and < 0.01–0.05 mg/kg respectively in the 0–10 cm horizon and declined to < 0.01 mg/kg by 28–195 days after application. No measurable residues of Compounds 28 and 30 were determined below 10 cm. DT_{50} values for azoxystrobin ranged between 3 and 39 days and DT_{90} were calculated to be between 87 and 433 days. A summary of the DT_{50} and DT_{90} values from all the European field dissipation trials is provided in Table 36.

Table 36 DT_{50} and DT_{90} values for azoxystrobin in the European field dissipation trials

Country	Year	Soil Type	Organic Matter (%)	pH	DT_{50} (days)	DT_{90} (days)
Germany	1993/94	sandy loam	2.2	6.4	3	87
	1994/95	sandy clay loam	2.2	6.2	4	353
United Kingdom	1993/94	clay	3.4	8.0	9	254
	1994/95	clay	4.8	8.1	11	298
Northern France	1993/94	silt loam	1.9	6.1	12	133
Southern France	1993/94	sandy loam	1.1	8.5	21	231
	1993/94	clay loam	1.8	7.7	17	190
	1994/95	clay loam	1.6	8.5	39	433
Italy	1993/94	clay loam	1.4	8.2	7	182
	1994/95	silty clay loam	1.7	8.3	24	260

Residues in rotational crops

The Meeting received three greenhouse confined accumulation studies on potential for uptake of azoxystrobin residues from the soil into rotational crops performed in the USA in 1993–1994.

In the first study (Tambling *et al.,* 1995; RR95–011B), [phenylacrylate-^{14}C]azoxystrobin was applied directly to sandy loam soil at 2.2 kg ai/ha. The application rate was based on the maximum seasonal application rate for azoxystrobin in the USA (corresponding to maximum of six applications of a single rate of 0.37 kg ai/ha or maximum of eight applications of a single rate of 0.28 kg ai/ha). Azoxystrobin was allowed to age on the soil for 30, 200, and 365 days. Rotational crops represented by radish, lettuce, and wheat were planted 30, 200, and 365 days after the treatment. The rotation intervals were based on crop failure (30 days), normal spring (200 days), and annual (365 days) rotation. Radish and lettuce were harvested at maturity while wheat was harvested at an immature stage to represent forage, and at maturity for separate analysis of grain and straw. All commodities were analysed for residues. In addition, soil samples collected at treatment and each planting interval were also analysed.

The total radioactive residues in the soil declined from 0.82 mg/kg at treatment to 0.69, 0.42, and 0.02 mg/kg at 30, 200, and 365 days after treatment, respectively. Radioactive residues were released from the crop samples by extraction with acetone/water and by enzyme or alkali hydrolysis.

The metabolism of azoxystrobin in rotational crops was complex with a large number of conjugated metabolites formed. The residues declined significantly with longer ageing time (plant back interval). Radioactive residues in the 365-day crops were generally in concentrations below 0.01 mg/kg. All metabolites detected in the extractable components of the 200 and 365-day rotational crops were also present in the 30-day crops. Since the residues were much higher in the 30-day crops, metabolites were identified in those samples.

Many of the metabolites in the rotational crops were glucose or amino acid conjugates of the corresponding primary crop metabolites. As in the primary crops, parent azoxystrobin represented the major residue detected in all rotated crops (up to 24% TRR), with very low actual residue levels in the tested crops (< 0.01–0.03 mg/kg at 30 days and < 0.01 mg/kg at 200 days), except for wheat forage and wheat straw at 30 days (0.15 and 1.4 mg/kg, respectively), which declined significantly with the longer aging time of 200 days (to 0.02 and 0.12 mg/kg, respectively). Compounds N1, N2, O2, and O3, which are the principal metabolites in rotated crops, are glucose conjugates and are found in the primary crops in both free and conjugated forms. A summary of the metabolites found in rotational crops treated with [^{14}C]-phenylacrylate-labelled azoxystrobin is provided in Table 37.

In the second greenhouse crop rotation trial (Goldsby *et al.,* 1995; RR95-034B), [pyrimidinyl-^{14}C]azoxystrobin was applied to sandy loam soil at a rate of 2.2 kg ai/ha, in a single application, to

simulate a worst case application. The rotational crops lettuce, radish and wheat were planted 30, 200 and 365 days after the last application. Time and interval of harvest of the different crops were the same as in the previous study with [phenylacrylate-^{14}C]azoxystrobin.

The total radioactivity of [pyrimidinyl-^{14}C]azoxystrobin in the soil declined from 1.0 mg/kg at treatment to 0.79, 0.67 and 0.24 mg/kg at day 30, 200, and 365 after the last treatment, respectively. Metabolism was extensive with a large amount of conjugated residues formed. All metabolites present in the 30-day crops were also detected in the 200 and 365-day crops but with rapidly decreasing amounts. Therefore, identification and characterization of metabolites were carried out with the residues of the 30-day crops. Metabolites present in the crops from the 200 and 365 day rotation were identified by comparison with the 30-day crop residue profile. Many of the metabolites in rotated crops were glucose or amino acid conjugates of the corresponding primary crop metabolites. Parent azoxystrobin was the major residue detected in all crops (up to 44% TRR), with very low levels present in the tested crops (< 0.01–0.08 mg/kg, < 0.01–0.01 mg/kg, and < 0.01 at 30, 200, and 365 days, respectively), except for wheat forage and wheat straw at 30 days (0.26 and 1.3 mg/kg, respectively), which declined significantly with the longer aging times (to 0.02 and 0.13 mg/kg, respectively at 200 days and < 0.01 and 0.01 mg/kg at 365 days). Compounds 42, N2, O2, and O3, which are the major metabolites detected in the rotational crops, are glucose conjugates and are found in the primary crops in both free and conjugated forms. Compound G2, a principal metabolite found in radish tops (14–25% TRR, < 0.01–0.2 mg/kg), is an amino acid conjugate of Compound 28. A summary of the metabolites found in rotational crops treated with [phenylacrylate-^{14}C]azoxystrobin is provided in Table 38.

The third greenhouse crop rotation study (Miller, 1995; RR95-017B) was carried out in applying [cyanophenyl-^{14}C]azoxystrobin and using the same study conditions, rate of application, rotational crops, planting times, and harvest intervals as in the two other studies using either the azoxystrobin labelled in the pyrimidinyl or phenylacrylate ring.

The total radioactivity of [^{14}C]cyanophenyl-labelled azoxystrobin in the soil declined from 0.74 mg/kg at treatment to 0.74, 0.37, and 0.10 mg/kg at day 30, 200, and 365 after the last treatment, respectively. The metabolism in rotated crops was similar to the two previous studies. The major metabolites which were analysed are listed in Table 39.

Results from the three confined rotational crop studies were similar when using either pyrimidinyl, cyclophenyl, or phenylacrylate-labeled azoxystrobin. The metabolism of azoxystrobin in rotational crops was similar across the analysed crops (wheat, radish, and lettuce) and similar, but more extensive than that observed in the primary crops. A large number of metabolites were produced in low concentrations.

Many of the metabolites produced were glucose or amino acid conjugates of metabolites which were found unconjugated in the primary crop metabolism studies. As in the primary crops, the parent, azoxystrobin was mostly found in amounts above 10% of the total radioactive residue. Other major metabolites found in the rotational crops were Compounds M2, N2, O2, and O3, which were also found in the primary crops at lower percentages of the total radioactive residue.

In general, [^{14}C]azoxystrobin was metabolized in succeeding crops by four major routes:

- hydrolysis of the ester to produce the free acid (Compound 2) followed by conjugation to glucose (Compound N2) and malonylglucose (Compound O3)
- (ii) reduction of the double bond on the acid (Compound 2) followed by conjugation to glucose (Compound N1) and malonylglucose (Compound O2 and M2)
- (iii) cleavage of the ether linkage to give two ring compounds followed by further conjugation to glucose (Compounds 40 and 42)
- (iv) mineralization to $^{14}CO_2$ and subsequent incorporation into natural products.

Table 37 Major metabolites of [phenylacrylate-^{14}C]-azoxystrobin in 30- and 200-day rotational crops

Crop	Inter-val days	Metabolites % (mg/kg)											
		Parent	Comp'd 2	Comp'd 30	Comp'd 3	Comp'd K2	Comp'd M1	Comp'd M2	Comp'd N1	Comp'd N2	Comp'd O1	Comp'd O2	Comp'd O3
Lettuce	30	17.4 (0.03)	3 (0.01)		1.9 (0.01)	–	7.5 (0.01)		8.6 (0.01)		2.8 (< 0.01)	14.8 (0.02)	17.6 (0.03)
	200	2.4 (< 0.01)	4.7 (< 0.01)		5.3 (< 0.01)	–	10 (< 0.01)		11.8 (< 0.01)		13.6 (< 0.01)		
Radish root	30	20.3 (0.02)	2.4 (< 0.01)	14.9 (0.02)	4.3 (< 0.01)	–	11 (0.01)	–	10 (0.01)		0.7 (< 0.01)		
	200	Trace (< 0.01)	14.2 (< 0.01)		– (< 0.01)	–	17.1 (< 0.01)	–	17.3 (< 0.01)		–		
Radish top	30	2.5 (0.01)	–	2.8 (0.01)	2 (< 0.01)	9.7 (0.05)	3.5 (0.02)	–	29 (0.14)		2.6 (0.01)	6.2 (0.03)	8.3 (0.04)
	200	–	–		15.5 (0.02)	–	2.7 (< 0.01)	–	35.7 (0.05)		5.9 (< 0.01)		
Wheat forage	30	12.3 (0.15)	2.4 (0.03)		6.7 (.08)	–	–	–	13.4 (0.16)		–	9.4 (0.11)	8.9 (0.1)
	200	9.5 (0.02)	5.1 (< 0.01)		14.6 (0.02)	–	–	–	7.8 (0.01)		11 (0.02)		
Wheat straw	30	23.8 (1.4)	5.6 (0.34)		10.4 (0.61)	–	–	–	5.8 (0.34)		2.1 (0.12)	3.7 (0.22)	8.1 (0.48)
	200	18.3 (0.12)	4.4 (0.03)		12.1 (0.08)	–	–	–	6.8 (0.05)		8.4 (0.06)		
Wheat grain	30	19 (< 0.01)	0.9 (< 0.01)	–	–	–	–	–	–	–	–	–	–

Table 38 Major metabolites of [pyrimidinyl-^{14}C]azoxystrobin in 30, 200 and 365-day rotational crops

Crop	Interval (days)	Metabolites % (mg/kg)						
		Parent	Compound 42	Compound N1	Compound N2	Compound O2	Compound O3	Compound G2
Lettuce	30	5.2 (0.01)	39 (0.11)	3.2 (< 0.01)		10.1 (0.03)		–
	200	2.7 (0.01)	36.9 (0.04)	2.9 (< 0.01)		5 (0.01)		–
	365	2.8 (< 0.01)	29.4 (< 0.01)	11.1 (< 0.01)				–
Radish root	30	43.9 (0.08)	2.3 (< 0.01)	2.4 (< 0.01)		–		–
	200	6.5 (< 0.01)	4.7 (< 0.01)	2.7 (< 0.01)		–		–
Radish tops	30	1.4 (0.02)	5.7 (0.06)	9.6 (0.11)		5.7 (0.06)	5.7 (0.06)	17.7
	200	0.3 (< 0.01)	5 (0.03)	10.1 (0.05)		4.6 (0.02)		25.1
	365	–	4.3 (< 0.01)	12.1 (< 0.01)				14.4

Crop	Interval (days)	Metabolites % (mg/kg)						
		Parent	Compound 42	Compound N1	Compound N2	Compound O2	Compound O3	Compound G2
Wheat forage	30	11.2 (0.26)	15.7 (0.37)	2.5 (0.06)		3.2 (0.07)	1.7 (0.04)	–
	200	3.9 (0.02)	10.5 (0.07)	1.9 (0.01)		1.4 (< 0.01)	1.9 (0.01)	–
	365	1.3 (< 0.01)	22.2 (0.02)	–		1.4 (0.01		–
Wheat straw	30	8.3 (1.26)	12.8 (1.94)	3.3 (0.51)		1.6 (0.25)	2.4 (0.37)	–
	200	5.2 (0.13)	12.8 (0.32)	2.1 (0.05)		2 (0.05)	1.9 (0.05)	–
	365	2.7 (0.01)	13.7 (0.05)	3.7 (0.01)		8.1 (0.03)		–
Wheat grain	30	2.2 (< 0.01)	1.9 (< 0.01	–		1.8 (< 0.01)		–
	200	–	–	–		–	–	–

Table 39 Major metabolites of [cyanophenyl–^{14}C]-azoxystrobin in 30- and 200-day rotational crops

Crop	Interval (days)	Parent	Metabolites % (mg/kg)								
			Compound 2	Compound 9	Compound 28	Compound 30	Compound 42	Carbo-hydrates	Compound C	Compound G2	Compound K2
Lettuce	30	17.3 (0.08)	–	–	4.3 (0.02)	–	41 (0.18)	–	–	–	–
	200	9.5 (0.01)	–	–	7.4 (< 0.01)	7.2 (< 0.01)	36.6 (0.04)	3.9 (< 0.01)	3.2 (< 0.01)	–	–
Radish root	30	16.3 (0.03)	2.3 (< 0.01)	–	9.5 (0.02)	5.9 (0.01)	–	–	–	–	3.2 (< 0.01)
	200	8.7 (< 0.01)	–	–	13.7 (< 0.01)	7.7 (< 0.01)	–	18.8 (< 0.01)	–	–	–
Radish top	30	1.5 (0.01)	–	–	5.2 (0.04)	0.9 (0.01)	6.7 (0.05)	4 (0.03)	1.6 (0.01)	31.2 (0.24)	6.6 (0.05)
	200	–	–	–	5.7 (0.02)	–	4.9 (0.01)	7.9 (0.02)	4.4 (0.01)	37.8 (0.11)	6.4 (0.02)
Wheat forage	30	15.6 (0.34)	1.3 (0.04)	–	4.6 (0.01)	1.6 (0.04)	24.3 (0.53)	11.2 (0.24)	2.8 (0.06)	–	1 (0.02)
	200	12.7 (0.05)	–	–	4.8 (0.02)	–	39.7 (0.17)	12.1 (0.05)	10.9 (0.05)	–	–
Wheat straw	30	14.8 (1.94)	3 (0.39)	0.9 (0.12)	5.9 (0.77)	2 (0.25)	23.3 (2.95)	11.7 (1.53)	3.2 (0.42)	–	–
	200	2.2 (0.06)	0.8 (0.02)	–	4.2 (0.12)	3 (0.08)	33.2 (0.97)	12.8 (0.37)	10 (0.29)	–	–
Wheat grain	30	2.3 (< 0.01)	2.3 (< 0.01)	–	1.7 (< 0.01)	1.5 (< 0.01)	1.5 (< 0.01)	12 (0.02)	3.2 (< 0.01)	–	–
	200	–	–	–	–	1.9 (< 0.01)	1.9 (< 0.01)	30.6 (0.02)	3.6 (< 0.01)	–	–

Crop	Interval (days)	Metabolites % (mg/kg)							
		Compound M1	Compound M2	Compound M3	Compound N1	Compound N2	Compound O1	Compound O2	Compound O3
Lettuce	30	–	–	–	–	2.8 (< 0.01)	–	13.3 (0.06)	12.3 (0.06)
	200	–	–	–	–	–	–	3.8 (< 0.01)	2.1 (< 0.01)
Radish root	30	1.9 (< 0.01)	3.4 (< 0.01)	3.4 (< 0.01)	1.9 (< 0.01)	3.4 (< 0.01)	1.9 (< 0.01)	–	–
	200	–	–	–	17.5 (< 0.01)		–	–	–
Radish top	30	–	1.3 (0.01	2.2 (0.02)	–	12.5 (0.1)	1.2 (0.01)	5.4 (0.04)	5.5 (0.04)
	200	–	–	–	–	13 (0.04)	–	–	–
Wheat forage	30	1.5 (0.03)	1.5 (0.03)	–	4.7 (0.1)	–	4.7 (0.1)	5.8 (0.12)	1.6 (0.04)
Wheat straw	30	–	–	–	1.2 (0.16)	1.7 (0.22)	1.2 (0.17)	3.3 (0.43)	6.2 (0.8)
	200	–	–	–	–	–	–	1.7 (0.05)	1.6 (0.05)
Wheat grain	30	–	–	–	2.6 (< 0.01)	–	–	–	–

Environmental fate in water-sediment systems

Hydrolysis

The hydrolysis rate of of [^{14}C]azoxystrobin labelled in the cyanophenyl ring was determined at 25 °C and 50 °C in buffered aqueous solutions at pH 5, 7 and 9 (Steel and Joseph, 1994; RJ1717B). The study was carried out under sterile conditions in the dark for up to 31 days. The initial concentrations of azoxystrobin were 2.5 and 2.6 µg/l for both the 25 °C and 50 °C experiments, respectively, and samples were taken for analysis by liquid scintillation counting (LSC) and TLC.

At 25 °C, there was no significant hydrolysis (< 10%) at any pH. At 50 °C, there was no significant hydrolysis (< 10%) at pH 5 or 7. At 50 °C and pH 9, analysis showed significant hydrolysis. Two products were identified: Compound 2 (up to 12%) and Compound 20 (up to 7.6%). The hydrolytic half-life of azoxystrobin at pH 9 and 50 °C was calculated to be 12.56 days. The systems were shown to be sterile, confirming the degradation at pH 9 and 50 °C to be true hydrolysis.

An additional study was carried out to study hydrolysis at pH 9 and 60 °C in order to be able to draw an Arrhenius plot to extrapolate azoxystrobin half-life at 20 °C (Tummon and Hurt, 1995; RJ1967B). The hydrolytic half-life of azoxystrobin at pH 9 and 60 °C was calculated to be 2.6 days. The system was shown to be sterile confirming the degradation at pH 9 and 60 °C to be true hydrolysis. Using the results of these two hydrolysis studies, an Arrhenius plot was drawn and the estimated hydrolytic half-life of azoxystrobin at 20 °C and pH 9 was calculated to be 2313 days.

Aqueous photolysis

The photolysis of [^{14}C]azoxystrobin, separately radiolabelled in the cyanophenyl, pyrimidinyl and phenylacrylate ring, in water was studied at 25 ± 1 °C in buffered aqueous solutions at pH 7 (Kuet and Hadfield, 1994; RJ1705B). The study was carried out under sterile conditions over a period of approximately 30 days using an artificial light source. The initial concentrations of azoxystrobin were

in the range of 3.04–3.29 µg/cm^3. Samples were taken at periods equivalent to 0, 1, 5, 10, 20 and 30 days of Florida summer sunlight.

The half-life was calculated to range between 11.1 and 17.1 days Florida summer sunlight which is equivalent to 11.6 and 17.9 days summer sunlight at 50ºN. Initial photoisomerisation to the Z-isomer (Compound 9) occurred rapidly. This was followed by further photodegradation. Azoxystrobin was the major component in all samples analysed accounting for up to 26% of the applied radioactivity at the final sampling interval. Only one photoproduct (Z-isomer) was present at levels greater than 10% of the applied radioactivity during the study. A number of other degradates were identified, Compound 28 being the most significant at 8.9% of the applied radioactivity. Analysis of control samples maintained in the dark showed that the degradation was solely due to photolysis. A separate experiment demonstrated that up to 6.2% of the applied radioactivity was evolved as volatile degradates after irradiation of azoxystrobin for the equivalent of 30 days Florida summer sunlight, with 5.4% of the applied radioactivity being characterized as CO_2. There was no evidence of volatilization of azoxystrobin in the study, as would be expected of a compound with a vapour pressure of 1.1×10^{-10} Pa.

The experimentally determined quantum yield for direct phototransformation in an aqueous acetonitrile solution following irradiation at 270–290 nm at 20 °C was 0.34 (Moffat, 1994; RJ1658B*)*. The initial concentration was 26.9 mg/L azoxystrobin. The environmental half-life due to direct photolysis of azoxystrobin in water under European conditions was calculated to be 45 and 170 days in summer sunlight, for 30 and 5 cm depths of water respectively. The corresponding lifetimes are 65 and 245 days.

Degradation in water/sediment systems

Azoxystrobin degradation was studied in two natural water sediment systems under laboratory conditions in the dark at 20 °C over 152 days (Warinton, 1994; RJ1679B). Azoxystrobin was radiolabelled in either the pyrimidine, cyanophenyl or phenylacrylate ring. Initial concentrations of azoxystrobin were between 84 and 91 µg/L, equivalent to a single application of 252 to 273 g ai/ha being evenly distributed in a 30 cm depth waterbody. The two sediments tested (systems S1 and S2) contained 22% and 8.0% organic matter, respectively.

After Day 0 and throughout the incubation period, the majority of the activity in the system (44–75 of applied radioactivity) was found in the sediment layer. Azoxystrobin was rapidly dissipated in water with a half-life of less than 7 days. The azoxystrobin degradation rate remained constant throughout the incubation. After 152 days, levels of extractable azoxystrobin had fallen to about 57% and 51% of the applied radioactivity in high and low organic matter systems, respectively. Table 40 summarizes the radioactive residues recovered in water-sediment systems after 152 days.

Table 40 Radioactive residues after 152 days in water-sediment systems S1 and S2 treated with [^{14}C]-azoxystrobin

Radioactive Component	Radioactivity Recovered (as % of applied)					
	[Pyrimidinyl-^{14}C]-		[Cyanophenyl-^{14}C]-		[Phenylacrylate-^{14}C]-	
	S1	S2	S1	S2	S1	S2
Azoxystrobin	56.0	51.1	49.7	60.9	46.9	59.6
Compound 2	18.1	14.4	20.3	17.3	15.8	15.0
Compound 3	2.7	1.2	ND	ND	1.3	0.7
Polar Compounds	2.0	1.5	1.3	0.8	1.2	1.4
Others	7.2	4.7	7.0	4.6	4.0	4.1
CO_2	2.9	1.5	6.1	3.1	6.2	3.1
Unextracted	8.1	5.8	6.4	6.7	5.5	5.1
Total	97.0	80.2	90.8	93.4	80.9	89.0

ND = Not detectable with this radiolabel.

Compound 2 was the major metabolite, present at about 17% of the applied activity 152 days after incubation. Compound 3 was detected at levels up to 2% of the applied radioactivity. After 152 days incubation, up to 6% of the applied radioactivity had been mineralized to CO_2. The maximum level of unextractable residue accounted for 6% of the applied radioactivity.

METHODS OF RESIDUE ANALYSIS

Analytical methods

The Meeting received information on analytical methods for azoxystrobin and its *Z*-isomer in samples of plant and animal origin.

Samples of plant origin

The analytical methods for samples of plant origin are summarized below, including the commodities, for which the methods were validated, analytes and their limit of quantitation (LOQ), determination technique, and a brief description of the method. The recoveries are summarized in Tables 41–44.

Method:	**RAM 243**
(Reference)	Burke and Sapiets, 1995; (RJ1729B); Burke and Sapiets, 1998 (RAM 243 EPA); Burke, 2000 (SOP RAM 243/06); Clarke, 1994 (RJ1557B); McGill, 2004; (02-6089)
Recoveries:	Table 41
Commodities:	Cereal grains, processed cereals, dried beans, peas, leafy crops, soft fruits, processed soft fruits, citrus fruits and juice, fruiting vegetables, root crops, stone fruits, and wine
Analytes:	Azoxystrobin and its Z-isomer
LOQ:	0.01 mg/kg (or mg/L), except for forage and straw (0.02 mg/kg)
Determination:	GC/NPD or HPLC-UV
Description:	Homogenized samples of banana, rice, leafy crop, dried beans, pea, cereal and processed cereal samples are extracted in 9:1 (v/v) acetonitrile:water solution. An aliquot of the extract is cleaned up by adsorption chromatography on a Florisil column. The eluate is evaporated to dryness and taken up in a known volume of toluene for analysis by GC-NPD. Citrus, root crops, stone fruit, fruiting vegetables, soft fruits and processed soft fruit samples are extracted in 9:1 (v/v) acetonitrile:water, then partitioned with dichloromethane. Liquid samples such as wine and citrus juice are partitioned directly into dichloromethane. An aliquot of the extract is cleaned up by adsorption chromatography on a silica sorbent. The eluate is evaporated to dryness and taken up in a known volume of toluene for analysis by GC-NPD or in a mobile phase for analysis by HPLC-UV.

Method:	**RAM 260**
(Reference)	Burke, 1997; (SOP RAM 260/03); Burke, 1997; (RAM 260 EPA); Burke, 1995; (RJ1787B); Burke, 1997; (RJ2385B)
Recoveries:	Table 42

Commodities:	Crops of high lipid content (peanut kernel and hull, processed peanut, pecan kernel, coffee bean, citrus skin, and canola oil)
Analytes:	Azoxystrobin and its Z-isomer
LOQ:	0.01 mg/kg
	0.05 mg/kg (or mg/L for peanut meal, peanut oil and oil seed rape
	0.1 mg/kg for peanut hull
Determination:	GC/NPD
Description:	Homogenized samples of peanut hull and kernel, pecan kernel, coffee bean, oil seed rape, citrus skin and processed peanut (except peanut oil) samples are extracted in 9:1 (v/v) acetonitrile:water solution. Peanut oil is extracted by shaking with acetonitrile. An aliquot of the extract is cleaned up by partitioning into dichloromethane. The eluate is then evaporated to dryness and re-dissolved in 75:25 (v/v) ethyl acetate:methanol for further clean up by gel permeation chromatography (GPC) eluting through Alumina-N and Florisil solid phase extraction cartridges. The eluate is evaporated to dryness and taken up in a known volume of acetone for analysis by GC-NPD.

Method:	**RAM 305**
(Reference)	Chaggar, et al., 2004; (SOP RAM 305/03); Lister, 1999; (RJ2770B); Chaggar, 2004; (RJ3552B); Kang, 2003; CEMR-1995; Kang, 2004; CEMR-1708
Recoveries:	Table 43
Commodities:	Various plant materials
Analytes:	Azoxystrobin and its Z-isomer
LOQ:	0.01 mg/kg
Determination:	LC-MS/MS
Description:	Homogenized samples are extracted with a 9:1 (v/v) mixture of acetonitrile and water. After clean-up using a C18 solid phase extraction procedure, residues of azoxystrobin and Z-isomer are determined by HPLC using triple quadrupole mass spectrometric detection (LC-MS/MS).

Method:	**DFG method S-19**, extended revision (German multiresidue enforcement method)
(Reference)	Klimmek, 2004; (IF-04/00192716); Specht, 1994; (ZEN-9402V); Weeren and Pelz, 2001; (ZEN-0002V); Lakaschus, 2005; (SYN-0422V)
Recoveries:	Table 44
Commodities:	Various plant materials
Analytes:	Azoxystrobin and its Z-isomer
LOQ:	0.01 mg/kg
Determination:	GC-MS or LC-MS/MS
Description:	Homogenized samples are extracted using acetone. Water is added before extraction to obtain water: acetone ratio of 2:1 (v/v). After addition of sodium chloride, azoxystrobin is partitioned into ethyl acetate:cyclohexane (1:1, v/v). The extract is cleaned by GPC, followed by a silica gel clean-up. The analysis is performed by GC-MS or LC-MS/MS.

Table 41 Recoveries of azoxystrobin and its Z-isomer in samples of plant origin using method RAM 243

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Banana	0.02–0.10	Azoxystrobin	13	102	95–110	5	Burke, 1998
		Z-isomer	13	108	99–115	5	RAM 243 EPA
Cereals, processed	0.01	Azoxystrobin	8	107	101–115	5	Burke, 1998
		Z-isomer	8	99	93–102	3	RAM 243 EPA
Cherry	0.01–1.0	Azoxystrobin	3	100	92–116	14	Bussey, 1998
		Z-isomer	3	85	80–89	5	RR 98-006B
Cucumber	0.10–0.50	Azoxystrobin	8	100	97–103	2	Burke, 1998
		Z-isomer	8	108	101–112	3	RAM 243 EPA
Grain	0.01–0.20	Azoxystrobin	9	97	84–106	6	Burke, 1995
		Z-isomer	9	107	96–127	7	RJ1729B
Grain	0.01–0.50	Azoxystrobin	20	102	95–110	5	Clarke, 1994
		Z-isomer	20	98	92–100	4	RJ1557B
Grape	0.01–0.50	Azoxystrobin	20	100	98–110	5	Burke, 2000
		Z-isomer	20	98	95–106	6	SOP 243/06
Grape	0.01–0.50	Azoxystrobin	20	102	98–110	3	Clarke, 1994
		Z-isomer	20	101	95–106	3	RJ15571B
Forage	0.20–2.0	Azoxystrobin	8	103	93–102	7	Burke, 1995 RJ1729B
Mango	0.01–0.20	Azoxystrobin	10	84	73–88	6	McGill, 2007
		Z-isomer	10	81	77–84	3	026089
Melon skin	0.2–0.50	Azoxystrobin	6	103	98–109	4	Burke, 1998
		Z-isomer	6	105	99–110	8	RAM 243 EPA
Melon pulp	0.02–0.10	Azoxystrobin	4	103	95–115	8	Burke, 1998
		Z-isomer	4	107	101–125	11	RAM 243 EPA
Orange juice	0.01–0.05	Azoxystrobin	8	104	98–113	5	Burke, 1998
		Z-isomer	8	103	97–107	3	RAM 243 EPA
Peach	0.10–0.20	Azoxystrobin	8	101	96–109	3	Burke, 1998
		Z-isomer	8	109	103–114	3	RAM 243 EPA
Peach	0.01–2.0	Azoxystrobin	5	94	87–102	6	Bussey, 1998
		Z-isomer	5	83	75–91	8	RR 98-009B
Plum	0.01–1.0	Azoxystrobin	4	86	70–95	13	Bussey, 1998
		Z-isomer	4	80	77–85	5	RR 98-010B
Straw	0.02–0.20	Azoxystrobin	12	99	85–110	8	Burke, 2000
		Z-isomer	22	90	70–102	10	SOP 243/06
Straw	0.02–5.0	Azoxystrobin	20	103	99–105	3	Clarke, 1994
		Z-isomer	20	95	85–100	4	RJ1557B
Tomato	0.05–0.50	Azoxystrobin	9	102	99–107	3	Burke, 1998
		Z-isomer	9	113	103–118	6	RAM 243 EPA
Tomato, processed	0.10–0.50	Azoxystrobin	3	102	99–101	2	Burke, 1998
		Z-isomer	3	106	99–111	4	RAM 243 EPA
Wine	10–500 µg/L	Azoxystrobin	20	100	96–106	3	Burke, 2000
		Z-isomer	20	100	94–106	3	SOP 243/06
Wine	10–500 µg/L	Azoxystrobin	20	100	96–106	3	Clarke, 1994
		Z-isomer	20	100	94–106	3	RJ15571B

Table 42 Recoveries of azoxystrobin and its Z-isomer in samples of plant origin using method RAM 260

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Coffee bean	0.05–0.50	Azoxystrobin	9	97	94–101	2	Burker, 1997
		Z-isomer	9	105	96–110	4	RJ2385B
Coffee bean	0.01–0.10	Azoxystrobin	12	104	98–110	5	Burke, 1997
		Z-isomer	12	108	102–110	5	SOP RAM 260/03

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Lemon skin	0.1–5.0	Azoxystrobin Z-isomer	9 9	99 105	97–103 100–110	2 3	Burke, 1997 RJ2385B
Oil seed rape	0.1	Azoxystrobin Z-isomer	8 8	98 100	90–104 92–112	6 6	Burke, 1997 SOP RAM 260/03
Oil seed rape	0.05–1.0	Azoxystrobin Z-isomer	15 15	100 104	83–112 88–122	10 11	Burke, 1997 SOP RAM 260/03
Orange skin	0.01–0.05	Azoxystrobin Z-isomer	10 10	105 105	88–123 90–126	10 10	Burke, 1997 SOP RAM 260/03
Pecan kernel	0.01–0.10	Azoxystrobin Z-isomer	12 12	98 106	93–101 96–110	2 5	Burke, 1995 RJ1787B
Pecan kernel	0.05–0.20	Azoxystrobin Z-isomer	6 6	104 102	95–108 98–104	5 3	Sapiets, 1995,1996 RJ2115B;RJ1950B
Peanut kernel	0.01–0.1	Azoxystrobin Z-isomer	16 16	100 100	94–106 94–110	4 4	Burke, 1995 RJ1787B
Peanut kernel	0.02–0.05	Azoxystrobin Z-isomer	10 10	105 105	95–115 90–116	7 8	Bussey, 1999 RR 98-046B
Peanut kernel	0.05–0.10	Azoxystrobin Z-isomer	15 15	102 95	92–116 88–104	6 5	Burke, 1997 SOP RAM 260/03
Peanut kernel	0.02	Azoxystrobin Z-isomer	3 3	92 97	85–95 90– 10	6 6	Burker, 1997 RJ2385B
Peanut hull	0.1	Azoxystrobin Z-isomer	4 4	103 107	100–105 104– 14	2 4	Burke, 1995 RJ1787B
Peanut meal	0.05–0.10	Azoxystrobin Z-isomer	4 4	102 97	95–108 92–104	5 5	Burke, 1997 SOP RAM 260/03
Peanut oil	0.05–0.10 µg/L	Azoxystrobin Z-isomer	6 6	99 102	93–102 96–107	3 4	Burke, 1997 SOP RAM 260/03

Table 43 Recoveries of azoxystrobin and its Z-isomer in samples of plant origin using method RAM 305

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Avocado	0.01–1.0	Azoxystrobin Z-isomer	11 11	90 90	83–103 86–94	6 2	Lister, 1999 RJ2770B
Barley grain	0.01–1.0	Azoxystrobin Z-isomer	8 8	84 87	83–86 82–91	1 4	Lister, 1999 RJ2770B
Beer	0.01–0.1	Azoxystrobin Z-isomer	10 10	86 87	61–97 58–92	11 9	Chaggar, 2004 RJ3552B
Cabbage	0.01–1.0	Azoxystrobin Z-isomer	8 8	96 96	92–101 92–100	3 3	Lister, 1999 RJ2770B
Cabbage	0.01–0.30	Azoxystrobin Z-isomer	10 10	90 90	83–96 87–95	5 3	Chaggar, 2004 RJ3552B
Carrot	0.01–1.0	Azoxystrobin Z-isomer	8 8	84 83	76–89 73–87	5 6	Lister, 1999 RJ2770B
Grape	0.01–1.0	Azoxystrobin Z-isomer	8 8	92 90	78–102 83–104	10 7	Lister, 1999 RJ2770B
Hops, dry	0.01–20	Azoxystrobin Z-isomer	10 10	82 80		15 12	Kang, 2003 CEMR-1995
Kale	0.01–1.0	Azoxystrobin Z-isomer	10 10	92 90	88–97 85–94	4 4	Kang, 2003 CEMR-1708
Leeks	0.01–1.0	Azoxystrobin Z-isomer	8 8	83 88	75–88 84–91	7 3	Lister, 1999 RJ2770B
Lentil	0.01–1.0	Azoxystrobin Z-isomer	8 8	82 82	69–98 66–98	12 12	Lister, 1999 RJ2770B
Lettuce	0.01–1.0	Azoxystrobin Z-isomer	8 8	89 93	80–94 78–99	5 7	Lister, 1999 RJ2770B
Lettuce	0.01–3.0	Azoxystrobin Z-isomer	10 10	92 90	89–95 86–95	2 4	Kang, 2003 CEMR-1708
Mandarin	0.01–10	Azoxystrobin Z-isomer	10 10	98 95	95–100 88–103	2 6	Chaggar, 2004 RJ3552B

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Melon	0.01–1.0	Azoxystrobin	8	91	81–97	7	Lister, 1999
		Z-isomer	8	96	93–100	3	RJ2770B
Oil seed rape	0.01–1.0	Azoxystrobin	8	84	80–88	3	Lister, 1999
		Z-isomer	8	84	79–89	4	RJ2770B
Onion	0.01–1.0	Azoxystrobin	8	80	61–87	11	Lister, 1999
		Z-isomer	8	80	60–87	11	RJ2770B
Orange skin	0.01–1.0	Azoxystrobin	8	94	83–118	11	Lister, 1999
		Z-isomer	8	90	87–94	3	RJ2770B
Orange flesh	0.01–1.0	Azoxystrobin	8	97	88–107	7	Lister, 1999
		Z-isomer	8	86	79–95	6	RJ2770B
Pea seed	0.01–1.0	Azoxystrobin	8	97	90–108	5	Lister, 1999
		Z-isomer	8	94	85–99	4	RJ2770B
Pear	0.01–1.0	Azoxystrobin	8	95	91–103	4	Lister, 1999
		Z-isomer	8	91	88–94	2	RJ2770B
Plum	0.01–1.0	Azoxystrobin	8	99	87–116	11	Lister, 1999
		Z-isomer	8	97	87–114	10	RJ2770B
Potato	0.01 1.0	Azoxystrobin	8	91	86–95	4	Lister, 1999
		Z-isomer	8	89	86–92	2	RJ2770B
Potato	0.01–0.1	Azoxystrobin	10	93	90–99	3	Kang, 2003
		Z-isomer	10	93	90–96	2	CEMR-1708
Strawberry	0.01–1.0	Azoxystrobin	8	90	79–107	9	Lister, 1999
		Z-isomer	8	92	87–98	4	RJ2770B
Sunflower seed	0.01–0.5	Azoxystrobin	10	93	81–114	9	Chaggar, 2004
		Z-isomer	10	93	86–101	5	RJ3552B
Sugarbeets	0.01–1.0	Azoxystrobin	11	94	80–115	13	Lister, 1999
		Z-isomer	11	94	82–112	9	RJ2770B
Tomato	0.01–1.0	Azoxystrobin	8	87	80–90	4	Lister, 1999
		Z-isomer	8	87	80–91	4	RJ2770B
Wheat straw	0.01–1.0	Azoxystrobin	8	99	91–110	8	Lister, 1999
		Z-isomer	8	94	89–100	4	RJ2770B
Wheat straw	0.01–7.5	Azoxystrobin	10	87	81–99	6	Chaggar, 2004
		Z-isomer	10	87	84–91	3	RJ3552B
Wheat grain	0.01–0.3	Azoxystrobin	10	87	81–99	8	Chaggar, 2004
		Z-isomer	10	95	89–102	4	RJ3552B
Wheat flour	0.01–0.10	Azoxystrobin	10	92	85–97	4	Chaggar, 2004
		Z-isomer	10	92	86–96	4	RJ3552B
Wheat forage	0.01–1.0	Azoxystrobin	8	99	90–103	5	Lister, 1999
		Z-isomer	8	97	89–106	5	RJ2770B

Table 44 Recoveries of azoxystrobin and its Z-isomer in samples of plant origin using the multiresidue method DFG S-19 (extended revision)

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Wheat forage	0.01–0.1	Azoxystrobin	4	105	95–121	10	Specht, 1994
		Z-isomer	4	111	101–119	7	ZEN-9402V
Wheat grain	0.01–0.1	Azoxystrobin	4	92	82–106	12	Specht, 1994
		Z-isomer	4	93	83–105	10	ZEN-9402V
Wheat straw	0.01–0.1	Azoxystrobin	4	110	100–119	7	Specht, 1994
		Z-isomer	4	104	93–116	12	ZEN-9402V
Rye grain	0.01–0.1	Azoxystrobin	4	106	102–109	3	Specht, 1994
		Z-isomer	4	92	87–101	7	ZEN-9402V
Rye straw	0.01–0.1	Azoxystrobin	4	109	93–120	12	Specht, 1994
		Z-isomer	4	94	80–100	10	ZEN-9402V
Barley grain	0.01–0.1	Azoxystrobin	4	92	71–105	18	Specht, 1994
		Z-isomer	4	110	99–121	8	ZEN-9402V
Barley straw	0.01–0.1	Azoxystrobin	4	88	74–109	17	Specht, 1994
		Z-isomer	4	84	72–99	13	ZEN-9402V
Grape	0.01–0.1	Azoxystrobin	4	97	94–106	7	Specht, 1994
		Z-isomer	4	101	89–105	8	ZEN-9402V

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Orange	0.02–0.2	Azoxystrobin	10	90	81–102	7	Weeren, 2001
Kohlrabi	0.02–0.2	Azoxystrobin	6	105	89–120	12	ZEN-0002V
Garlic	0.05– 0.5	Azoxystrobin	6	111	100–120	6	
Chamomile	0.05–0.5	Azoxystrobin	6	99	79–126	22	
Fennel seed	0.05–0.5	Azoxystrobin	6	119	109–131	7	
Black tea	0.05–0.5	Azoxystrobin	6	77	62–94	17	
Lettuce	0.01–3.0	Azoxystrobin	10	88	84–95	4	Klimmek, 2004
		Z-isomer	10	89	84–97	4	IF-04/00192716
Wheat grain	0.01–0.3	Azoxystrobin	10	83	76–92	5	Klimmek, 2004
		Z-isomer	10	84	81–89	3	IF-04/00192716
Oilseed rape	0.01–0.5	Azoxystrobin	10	87	71–95	10	Klimmek, 2004
		Z-isomer	10	87	68–99	12	IF-04/00192716
Orange	0.01–10	Azoxystrobin	10	84	75–94	7	Klimmek, 2004
		Z-isomer	10	80	65–96	14	IF-04/00192716

Samples of animal origin

The analytical methods for samples of animal origin are summarized below, including the commodities, for which the methods were validated, analytes and their limit of quantitation (LOQ), determination technique, and a brief description of the method. The recoveries are summarized in Tables 45–47.

Method: **RAM 255**
(Reference) Ryan, 1999; (SOP RAM 255); Burke and Sapiets, 1998; (RAM 255 EPA); Coombe, 1996; (CEMR-516)
Recoveries: Table 45
Commodities: Animal tissues, milk and eggs
Analytes: Azoxystrobin and its Z-isomer
LOQ: 0.01 mg/kg
0.001 mg/kg for milk
Determination: GC/NPD
Description: Homogenized samples of animal tissues and eggs are extracted with acetonitrile. Milk is extracted using acetonitrile and partitioned into dichloromethane. An aliquot of the extract is cleaned up GPC eluting through alumina and Florisil solid phase extraction cartridges. The eluate is evaporated to dryness and taken up in a known volume of toluene for analysis by GC-NPD.

Method: **RAM 399**
(Reference) Crook, 2002; (SOP RAM 399); Richards, 2002; (RJ3350B); Atkinson, 2003; (CEMR-1907)
Recoveries: Table 46
Commodities: Animal tissues, milk and eggs
Analytes: Azoxystrobin and its Z-isomer
LOQ: 0.01 mg/kg
Determination: LC-MS/MS
Description: Homogenized samples are extracted with acetonitrile. Extracts are centrifuged and aliquots are diluted with ultra-pure water. A C18 solid phase extraction (SPE) procedure is carried out to facilitate sample clean-up. The analysis is performed using LC-MS/MS.

Method: **DFG method S-19**, extended revision (German multiresidue enforcement method)
(Reference) Specht and Thier, 1995; ZEN-9505V
Recoveries: Table 47
Commodities: Animal tissues, milk and eggs

Analytes: Azoxystrobin
LOQ: 0.02 mg/kg
Determination: GC-MS
Description: Homogenized samples are extracted using acetone. Water is added before extraction to obtain water: acetone ratio of 2:1 (v/v). After addition of sodium chloride, azoxystrobin is partitioned into ethyl acetate:cyclohexane (1:1, v/v). The extract is cleaned by GPC, followed by a GC-MS analysis.

Table 45 Recoveries of azoxystrobin and its Z-isomer in samples of animal origin using method RAM 255

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Milk	0.001–0.02	Azoxystrobin Z-isomer	18	96 102	74–119 79–122	11 14	Ryan and Sapiets, 1996, RJ1809B
Egg	0.01–0.10	Azoxystrobin Z-isomer	16	86 98	78–100 90–110	8 6	Ryan and Sapiets, 1996, RJ1809B
Liver	0.01–0.10	Azoxystrobin Z-isomer	18 18	98 99	78–122 83–125	12 10	Ryan and Sapiets, 1996, RJ1809B
Muscle	0.01–0.10	Azoxystrobin Z-isomer	6 6	97 112	86–106 87–140	7 18	Ryan and Sapiets, 1996, RJ1809B
Fat	0.01–0.10	Azoxystrobin Z-isomer	6 6	99 100	85–124 91–111	13 8	Ryan and Sapiets, 1996, RJ1809B

Table 46 Recoveries of azoxystrobin and its Z-isomer in samples of animal origin using method RAM 399

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Bovine muscle	0.01–0.1	Azoxystrobin Z-isomer	10 10	97 95	94–99 90–100	2 4	Richards, 2002 RJ3350B
Bovine muscle	0.01–0.1	Azoxystrobin Z-isomer	10 10	96 96	91–109 91–109	5 6	Atkinson, 2003 CEMR-1907
Bovine fat	0.01–0.1	Azoxystrobin Z-isomer	10 10	96 91	92–101 87–97	3 3	Richards, 2002 RJ3350B
Bovine milk	0.01–0.1	Azoxystrobin Z-isomer	10 10	94 94	89–101 91–97	3 2	Richards, 2002 RJ3350B
Bovine milk	0.01–0.1	Azoxystrobin Z-isomer	10 10	98 98	91–110 90–111	7 8	Atkinson, 2003 CEMR-1907
Lamb's kidney	0.01–0.1	Azoxystrobin Z-isomer	10 10	98 97	91–104 92–107	4 5	Richards, 2002 RJ3350B
Lamb's liver	0.01–0.1	Azoxystrobin Z-isomer	10 10	93 90	87–07 87–95	4 3	Richards, 2002 RJ3350B
Hen's eggs	0.01–0.1	Azoxystrobin Z-isomer	10 10	95 95	91–98 89–98	3 3	Richards, 2002 RJ3350B

Table 47 Recoveries of azoxystrobin in samples of animal origin using the multiresidue method DFG S-19 (extended revision)

Matrix	Fortification (mg/kg)	Analyte	n	Mean recovery (%)	Range recovery (%)	RSD (%)	Reference
Milk	0.02–0.2	Azoxystrobin	4	94	80–112	14	Specht and Their, 1995, ZEN-9595V
Muscle	0.02–0.2	Azoxystrobin	4	102	92–118	11	Specht and Their, 1995, ZEN-9595V
Liver	0.2	Azoxystrobin	2	83	80–86	–	Specht and Their, 1995, ZEN-9595V

Stability of pesticide residues in stored analytical samples

The Meeting received information on the stability of azoxystrobin in freezer-stored samples of plant and animal origin.

Samples of wheat straw, grain, grapes, wine, peanuts, pecans, tomatoes, apples, bananas, cucumbers, peaches, and oilseed rape were fortified with azoxystrobin and analysed after 3–24 months of storage at ≤ –18°C [Burke, 1995 (RJ1858B); Burke, 1996 (RJ 2056B); Burke, 1997 (RJ2404B)]. Samples were analysed following extraction with acetonitrile/water, purification by adsorption chromatography and analysis by method RAM 243 with amendments. In high lipid compounds like peanuts, pecans and oilseed rape, azoxystrobin residues were determined by method RAM 260.

Procedural recoveries from samples fortified with azoxystrobin at 0.1 mg/kg are shown in Table 48. The stability of residues in stored crops is shown in Table 49. Recoveries of residues from stored samples ranged from 74–146% of azoxystrobin indicating that residues were stable following up to 2 years of storage under frozen conditions.

Table 48 Procedural recoveries of azoxystrobin in storage stability samples

Crop	Mean recovery (%)	RSD (%)
Wheat straw	100	5
Wheat grain	103	3
Grapes	101	3
Wine	101	2
Peanuts	103	6
Pecans	101	6
Tomatoes	99	7
Bananas	95	8
Cucumbers	97	3
Apples	97	4
Peaches	98	5
Oilseed rape seed	99	5

Table 49 Stability of azoxystrobin in various freezer-stored crops (3–24 months of storage)

Storage period (days)	Azoxystrobin (mg/kg)									Range recovery (%)
	0	91–92	143–155	163–173	293	296–297	369–387	434	717–739	
Wheat straw	2.4			3.5	2.8	2.7		3	2.7	113–146
Wheat grain	0.1			0.11	0.1	0.09			0.08	80–110
Grapes	0.39		0.42		0.37	99		0.41	0.4	95–108
Wine	99		111					104	100	100–120
Peanuts	0.11		0.11				0.09		0.08	73–100
Pecans	0.1		0.11				0.08		0.08	73–100
Tomatoes	0.1		0.08				0.09		0.08	80–90
Bananas	0.1	0.1					0.09		0.09	90–100
Cucumbers	0.09	0.1					0.09		0.09	100–111
Apples	0.21			0.18			0.19		0.2	86–95
Peaches	0.21			0.18			0.19		0.2	86–95
Oilseed rape	0.1			0.09			0.1		0.1	90–100

Samples of soyabean meal, maize grits, carrot root, lettuce leaf, wheat forage, orange oil, juice and pulp were fortified with 0.1 mg/kg azoxystrobin and analysed after 1–24 months of storage at ≤ –18°C (Gill, 2005; RJ3170B). Straw samples contained incurred residues. Samples were analysed

using the LC-MS/MS method (RAM 305). Residues found following storage and procedural recoveries are shown in Table 50. Recoveries of residues from stored samples ranged from 56–109% of azoxystrobin indicating that residues were stable following up to two years of frozen storage. The low (below 70%) recovery of 56% occurred from a single sample of orange pulp which also had low (69%) concurrent recoveries.

Table 50 Residues and procedural recoveries of azoxystrobin in various freezer-stored crops (1–24 months of storage)

Storage period (months)		0	1	6	12–15	24	Range % recovery[a]
Soybean meal	Residue (mg/kg)	0.095	0.083	0.078	0.092	0.086	83–95
	Recovery (%)	98	93	87	81	90	
Maize grits	Residue (mg/kg)	0.098	0.1	0.086	0.084	0.098	84–100
	Recovery (%)	99	93	94	76	96	
Carrot root	Residue (mg/kg)	0.096	0.094	0.078	0.093	0.097	78–97
	Recovery (%)	94	100	75	92	95	
Leaf lettuce	Residue (mg/kg)	0.105	0.103	0.09	0.091	0.096	90–105
	Recovery (%)	100	103	100	87	91	
Wheat forage	Residue (mg/kg)	0.08	0.098	0.079	0.086	0.096	79–99
	Recovery (%)	88	95	86	88	97	
Orange oil	Residue (mg/kg)	0.094	0.105	0.082	0.098	0.094	82–105
	Recovery (%)	95	106	80	82	83	
Orange juice	Residue (mg/kg)	0.109	0.081	0.085	0.086	0.089	81–109
	Recovery (%)	108	94	89	79	85	
Orange pulp	Residue (mg/kg)	0.079	0.091	0.056	0.078	0.096	56–96
	Recovery (%)	80	109	69	76	96	

[a] Uncorrected recovery

Samples of peanut oil and meal, wheat bran and tomato juice and paste were fortified with 0.1 mg/kg azoxystrobin and analysed after 4–12 months of storage at ≤ –18 °C (Burke, 1996; RJ2221B). Samples were analysed following extraction with acetonitrile/water, purification by adsorption chromatography and analysis by method RAM 243 or RAM 260 (peanut meal and oil). Procedural recoveries from samples and azoxystrobin residues in stored processed commodities are shown in Table 51. Recoveries of residues from stored samples ranged from 90–110%, indicating that residues were stable following up to one year of storage.

Table 51 Residues and procedural recoveries of azoxystrobin in various freezer-stored processed plant commodities (4–12 months of storage)

Storage period (days)	Peanut oil (mg/kg)	Peanut meal (mg/kg)	Wheat bran (mg/kg)	Tomato juice (mg/kg)	Tomato paste (mg/kg)
0	96	0.10	0.10	0.10	0.10
125			0.09		
131		0.09			
133	86				
135				0.10	0.09
362				0.10	0.09
365		0.10			
371	100				
372			0.11		

Storage period (days)	Peanut oil (mg/kg)	Peanut meal (mg/kg)	Wheat bran (mg/kg)	Tomato juice (mg/kg)	Tomato paste (mg/kg)
Range % recovery	**90–104**	**90–100**	**90–110**	**100**	**90**
Procedural recovery (%)	99	103	105	98	98
RSD (%)	3	5	2	4	3

The stability of azoxystrobin in beef muscle, liver, kidney, fat, milk and eggs under freezer storage conditions was investigated at ≤ –18 °C for up to about ten months (Sapiets, 1997; RJ2351B). Samples were homogenized and aliquots of each tissue weighed into pre-labelled PVC tubes similar to those used for routine storage. The samples were fortified with 0.1 mg/kg azoxystrobin (milk with 0.01 mg/kg) prior to storage in the freezer. Duplicate samples were removed and analysed by method RAM 255 at nominal zero time and after storage for approximately four and nine months. No apparent decrease in residue levels was found in any of the samples. Minimum of 80% of the initial fortification was recovered at each interval. Azoxystrobin residues were stable for at least ten months under freezer storage conditions (≤ –18 °C). Results are summarized in Table 52.

Table 52 Residues and procedural recoveries of azoxystrobin in freezer-stored animal commodities (4–10 months of storage)

Tissue	Storage period (months)	Procedural recovery (%)	Recovery from stored samples				
			Individual stored samples (mg/kg)		Mean (mg/kg)	Mean Corrected (mg/kg)[a]	% of fortification level[b]
Beef muscle	0	98	0.097	0.094	0.10	0.10	100
	4–5	101	0.094	0.098	0.10	0.10	102
	9–10	105	0.102	0.099	0.10	0.10	98
Beef liver	0	91	0.088	0.091	0.09	0.10	100
	4–5	96	0.104	0.098	0.10	0.10	105
	9–10	93	0.098	0.102	0.10	0.11	109
Beef kidney	0	98	0.092	0.095	0.09	0.09	100
	4–5	96	0.100	0.099	0.10	0.10	113
	9–10	99	0.087	0.098	0.09	0.09	99
Beef fat	0	97	0.095	0.094	0.09	0.09	100
	4–5	99	0.098	0.098	0.10	0.10	109
	9–10	104	0.099	0.086	0.09	0.09	93
Milk	0	102	0.010	0.010	0.01	0.01	100
	4–5	94	0.011	0.010	0.01	0.01	100
	9–10	106	0.010	0.009	0.01	0.01	100
Eggs	0	99	0.103	0.112	0.11	0.11	100
	4–5	100	0.110	0.113	0.11	0.11	99
	9–10	101	0.092	0.096	0.09	0.09	80

[a] corrected for control and procedural recovery < 100%

[b] corrected for control and procedural recovery < 100% and normalised on mean 0 month recovery

USE PATTERN

Azoxystrobin is a broad spectrum fungicide from the strobilurin group of compounds. It exerts its fungicidal activity by inhibiting mitochondrial respiration in fungi. Azoxystrobin is a systemic

compound that is translocated in the transpiration stream from the roots to the stem and into the leaves. Taken up by leaves, roots and seeds, it is claimed to have protectant and eradicant properties. Compared with the major classes of systemic fungicides, azoxystrobin has a high level of intrinsic activity and the broadest spectrum; therefore, it is active at very low doses against a wide range of fungal pathogens.

The Meeting received information on azoxystrobin registered uses in Brazil, France, Germany, Italy, Malaysia, the Netherlands, South Africa, Spain, Switzerland, the UK, and the USA. Table 52 provides a summary of the use pattern for crops, on which supervised trials were conducted. This information is based on the original labels and their translations provided by the manufacturer.

Table 53 Registered uses of azoxystrobin in Brazil, France, Germany, Italy, Malaysia, the Netherlands, South Africa, Spain, Switzerland, the UK, and the USA

Crop	Country	Formulation		Application				PHI days
		g ai/L or g ai/kg	Type	Method	Rate kg ai/ha	Rate kg ai/hL	Season max kg ai/ha or (No)	
Almond	USA	800	WG	Foliar	0.28		1.7 (6)	28
Almond	USA	250	SC	Foliar	0.28		1.7 (6)	28
Artichoke	Spain	250	SC	Foliar	0.25		(3)	7
Artichoke	France	250	SC	Foliar	0.25		(3)	7
Artichoke	USA	800	WG	Foliar	0.28		1.7 (6)	0
Artichoke	USA	250	SC	Foliar	0.28		1.7 (6)	0
Asparagus	UK	250	SC	Foliar	0.25		(3)	
Asparagus	France	250	SC	Foliar	0.25		(3)	–
Asparagus	Germany	250	SC	Foliar	0.25		(2)	–
Asparagus	Italy	250	SC	Foliar	0.25		(3)	–
Asparagus	USA	800	WG	Foliar	0.28		1.7 (6)	100
Asparagus	USA	250	SC	Foliar	0.28		1.7 (6)	100
Banana	USA	800	WG	Foliar	0.15		1.2 (8)	0
Banana	USA	250	SC	Foliar	0.15		1.2 (8)	0
Banana	USA	250	SC	Post-harvest spray, dip or paint		0.04	(1)	–
Barley	France	250	SC	Foliar	0.25		(2)	42
Barley	Germany	250	SC	Foliar	0.25		(2)	35
Barley	Italy	250	SC	Foliar	0.25		(2)	35
Barley	Netherlands	250	SC	Foliar	0.25		(2)	35
Barley	Spain	250	SC	Foliar	0.20–0.25		(2)	36
Barley	Switzerland	250	SC	Foliar	0.25		(1)	–
Barley	UK	250	SC	Foliar	0.25		(2)	Up to GS 71
Barley	UK	200[f]	SC	Foliar	0.20		(2)	Up to GS 71
Berries, bushberry subgroup[a]	USA	800	WG	Foliar	0.28		0.84 (3)	0
Berries, bushberry subgroup[a]	USA	250	SC	Foliar	0.28		0.84 (3)	0
Berries, caneberry subgroup[b]	USA	800	WG	Foliar	0.28		1.7 (6)	0
Berries, caneberry subgroup[b]	USA	250	SC	Foliar	0.28		1.7 (6)	0
Broccoli	France	250	SC	Foliar	0.25		(2)	14
Broccoli	Netherlands	250	SC	Foliar	0.25		(2)	14
Broccoli	Germany	250	SC	Foliar	0.25		(2)	14
Broccoli	UK	250	SC	Foliar	0.25		(2)	14

Crop	Country	Formulation		Application				PHI days
		g ai/L or g ai/kg	Type	Method	Rate kg ai/ha	Rate kg ai/hL	Season max kg ai/ha or (No)	
Brassica, head and stem subgroup[c]	USA	800	WG	Foliar	0.28		1.7 (6)	0
Brassica, head and stem subgroup[c]	USA	250	SC	Foliar	0.28		1.7 (6)	0
Brassica, leafy greens subgroup[d]	USA	800	WG	Foliar	0.28		0.84 (3)	0
Brassica, leafy greens subgroup[d]	USA	250	SC	Foliar	0.28		0.84 (3)	0
Brussels sprouts	Italy	250	SC	Foliar	0.25		(2)	14
Brussels sprouts	France	250	SC	Foliar	0.25		(2)	14
Brussels sprouts	UK	250	SC	Foliar	0.25		(2)	14
Brussels sprouts	Netherlands	250	SC	Foliar	0.25		(2)	14
Brussels sprouts	Germany	250	SC	Foliar	0.25		(2)	14
Bulb vegetables[e]	USA	800	WG	Foliar	0.28		1.7 (6)	0
Bulb vegetables[e]	USA	250	SC	Foliar	0.28		1.7 (6)	0
Cabbage	Italy	250	SC	Foliar	0.25		(2)	14
Cabbage	France	250	SC	Foliar	0.25		(2)	14
Cabbage	UK	250	SC	Foliar	0.25		(2)	14
Cabbage	Netherlands	250	SC	Foliar	0.25		(2)	14
Cabbage	Germany	250	SC	Foliar	0.25		(2)	14
Cauliflower	Italy	250	SC	Foliar	0.25		(2)	14
Cauliflower	France	250	SC	Foliar	0.25		(2)	14
Cauliflower	Netherlands	250	SC	Foliar	0.25		(2)	14
Cauliflower	Germany	250	SC	Foliar	0.25		(2)	10
Cauliflower	UK	250	SC	Foliar	0.25		(2)	14
Celery	France	250	SC	Foliar	0.20		(3)	14
Celery	Germany	250	SC	Foliar	0.25		(2)	14
Celery	Italy	250	SC	Foliar	0.25		(3)	7
Citrus fruit	USA	800	WG	Foliar	0.28		1.7 (6)	0
Citrus fruit	USA	250	SC	Foliar	0.28		1.7 (6)	0
Citrus fruit	USA	250	SC	Post-harvest dip		0.12	(2)	–
Citrus fruit	USA	250	SC	Post-harvest drench, flood, or spray		4 kg ai/ ton fruit	(2)	–
Cotton	USA	800	WG	In-furrow	0.019 kg ai/km		(1)	–
Cotton	USA	250	SC	In-furrow				
Cotton	USA	250	SC	Foliar	0.17		0.5 (3)	45
Cranberry	USA	800	WG	Foliar	0.28		1.7 (6)	3
Cranberry	USA	250	SC	Foliar	0.28		1.7 (6)	3
Cucumber	France	250	SC	Foliar		0.020	(3)	3
Cucumber, outdoor	Italy	250	SC	Foliar	0.20		(3)	3
Cucumber	Italy	250	SC	Foliar		0.025	(3)	3
Cucumber, field	Germany	250	SC	Foliar	0.25		(2)	3
Cucumber, glasshouse	Germany	250	SC	Foliar	0.24		(2)	3
Cucumber, glasshouse	Netherlands	250	SC	Foliar		0.020	(3)	1
Cucumber	Spain	250	SC	Foliar	0.20		(3)	3
Cucumber	Switzerland	250	SC	Foliar		0.025	(3)	3
Cucurbits[g]	USA	250	SC	Foliar	0.28		1.7 (6)	1
Cucurbits[g]	USA	800	WG	Foliar	0.28		1.7 (6)	1
Endive	Germany	250	SC	Foliar	0.25		(2)	14
Endive (root production)	France	250	SC	Foliar	0.25		(3)	21

Crop	Country	Formulation		Application				PHI days
		g ai/L or g ai/kg	Type	Method	Rate kg ai/ha	Rate kg ai/hL	Season max kg ai/ha or (No)	
Endive (chicon production)	France	250	SC	Foliar	2.5		(3)	21
Gherkin	France	250	SC	Foliar	0.20		(3)	3
Gherkin	Italy	250	SC	Foliar	0.20		(3)	3
Grapes	USA	800	WG	Foliar	0.28		1.7 (6)	14
Grapes	USA	250	SC	Foliar	0.28		1.7 (6)	14
Herbs (basil, chives, parsley, etc.)	USA	800	WG	Foliar	0.28		1.7 (6)	0
Herbs (basil, chives, parsley, etc.)	USA	250	SC	Foliar	0.28		1.7 (6)	0
Hops	Germany	250	SC	Foliar	0.4 after BBHC 55		0.8 (2)	28
Kohlrabi	Germany	250	SC	Foliar	0.25		(2)	14
Leeks	Italy	250	SC	Foliar	0.25		(2)	15
Leeks	France	250	SC	Foliar	0.25		(3)	50
Leeks	Germany	250	SC	Foliar	0.25		(2)	42
Leeks	Netherlands	250	SC	Foliar	0.25		(4)	21
Leeks	Switzerland	250	SC	Foliar	0.25		(2)	14
Leeks	UK	250	SC	Foliar	0.25		(4)	21
Legume vegetables	USA	800	WG	Foliar	0.28		1.7 (6)	0
Legume vegetables	USA	250	SC	Foliar	0.28		1.7 (6)	0
Lettuce	France	250	SC	Foliar	0.25		(3)	14
Lettuce	Germany	250	SC	Foliar	0.25		(2)	14
Lettuce	Italy	250	SC	Foliar	0.25		(3)	7
Lettuce	Netherlands	250	SC	Foliar	0.25		(3)	14
Lettuce	Spain	250	SC	Foliar	0.25		(3)	7
Lettuce	Switzerland	250	SC	Foliar	0.25		(3)	21
Lettuce	USA	800	WG	Foliar	0.28		1.7 (6)	0
Lettuce	USA	250	SC	Foliar	0.28		1.7 (6)	0
Maize	USA	800	WG	Foliar	0.28		2.2 (8)	7
Maize	USA	250	SC	Foliar	0.28		2.2 (8)	7
Mango	Brazil	500	WG	Foliar	0.06	0.008	(6)	2
Mango	South Africa	250	SC	Foliar		0.01	(2)	21
Mango	USA	800	WG	Foliar	0.28		1.7 (6)	0
Mango	USA	250	SC	Foliar	0.28		1.7 (6)	0
Melon	France	250	SC	Foliar	0.20		(3)	3
Melon, glasshouse	Germany	250	SC	Foliar	0.24		(2)	3
Melon, outdoor	Italy	250	SC	Foliar	0.20		(3)	3
Melon	Italy	250	SC	Foliar		0.025	(3)	3
Melon, glasshouse	Netherlands	250	SC	Foliar		0.020	(3)	3
Melon	Spain	250	SC	Foliar	0.20		(3)	3
Melon	Switzerland	250	SC	Foliar		0.025	(3)	3
Mint (fresh)	USA	250	SC	Foliar	0.28		0.84 (3)	0
Mint (fresh)	USA	800	WG	Foliar	0.28		0.84 (3)	0
Mint (for processing	USA	250	SC	Foliar	0.28		0.84 (3)	7
Mint (for processing)	USA	800	WG	Foliar	0.28		0.84 (3)	7
Oat	Germany	250	SC	Foliar	0.25		(2)	35
Oat	UK	250	SC	Foliar	0.25		(2)	Up to GS 71

Crop	Country	Formulation		Application				PHI days
		g ai/L or g ai/kg	Type	Method	Rate kg ai/ha	Rate kg ai/hL	Season max kg ai/ha or (No)	
Papaya	Brazil	500	WG	Foliar	0.064	0.008	(4)	3
Papaya	Malaysia	250	SC	Foliar	0.11	0.011	(2)	1
Peanut	USA	250	SC	Foliar	0.45		0.9 (2)	14
Peanut	USA	800	WG	Foliar	0.45		0.9 (2)	14
Pecan	USA	800	WG	Foliar	0.22		1.3 (6)	45
Pecan	USA	250	SC	Foliar	0.22		1.3 (6)	45
Pepper	France	250	SC	Foliar	0.25		(3)	3
Pepper, glasshouse	Germany	250	SC	Foliar	0.24		(2)	3
Pepper, outdoor	Italy	250	SC	Foliar	0.20		(3)	3
Pepper	Italy	250	SC	Foliar		0.025	(3)	3
Pepper, glasshouse	Netherlands	250	SC	Foliar		0.020	(3)	1
Pepper	Spain	250	SC	Foliar	0.20	0.020	(3)	3
Pistachio	USA	800	WG	Foliar	0.28		1.7 (6)	7
Pistachio	USA	250	SC	Foliar	0.28		1.7 (6)	7
Plantain	USA	800	WG	Foliar	0.15		1.2 (8)	0
Plantain	USA	250	SC	Foliar	0.15		1.2 (8)	0
Plantain	USA	250	SC	Post-harvest spray, dip or paint		0.04	(1)	–
Potato	Germany	250	SC	Foliar	0.13		(3)	7
Potato	Netherlands	250	SC	In-furrow	0.75		(1)	–
Potato	Netherlands	250	SC	Pre-plant, full field	1.5		(1)	–
Potato	Netherlands	250	SC	Foliar	0.063		(2)	7
Potato	UK	250	SC	In-furrow	0.75		(1)	–
Potato	UK	250	SC	Pre-plant, full field	1.5		(1)	–
Rapeseed	USA	800	WG	Foliar	0.28		0.5	30
Rapeseed	USA	250	SC	Foliar	0.28		0.5	30
Rice	USA	800	WG	Foliar	0.34		0.78	28
Rice	USA	250	SC	Foliar	0.34		0.78	28
Root vegetables[h]	USA	800	WG	Foliar	0.37		2.2 (6)	0
Root vegetables[h]	USA	250	SC	Foliar	0.37		2.2 (6)	0
Rye	France	250	SC	Foliar	0.25		(2)	42
Rye	Germany	250	SC	Foliar	0.25		(2)	35
Rye	Switzerland	250	SC	Foliar	0.25		(1)	–
Rye	UK	250	SC	Foliar	0.25		(2)	Up to GS 71
Soybeans, seeds	USA	800	WG	Foliar	0.28		1.7 (6)	14
Soybeans, seeds	USA	250	SC	Foliar	0.28		1.7 (6)	14
Soybeans, forage and hay	USA	800	WG	Foliar	0.28		(1)	0
Soybeans, forage and hay	USA	250	SC	Foliar	0.28		(1)	0
Stone fruit	USA	800	WG	Foliar	0.28		1.7 (6)	0
Stone fruit	USA	250	SC	Foliar	0.28		1.7 (6)	0
Strawberry	USA	800	WG	Foliar	0.28		1.1 (4)	0
Strawberry	USA	250	SC	Foliar	0.28		1.1 (4)	0
Sunflower	USA	800	WG	Foliar	0.28		0.5	30
Sunflower	USA	250	SC	Foliar	0.28		0.5	30
Tomato	France	250	SC	Foliar	0.25		(3)	3
Tomato, glasshouse	Germany	250	SC	Foliar	0.24		(2)	3
Tomato, outdoor	Italy	250	SC	Foliar	0.20		(3)	3
Tomato	Italy	250	SC	Foliar		0.025	(3)	3
Tomato	Spain	250	SC	Foliar	0.20	0.020	(3)	3

Crop	Country	Formulation		Application				PHI days
		g ai/L or g ai/kg	Type	Method	Rate kg ai/ha	Rate kg ai/hL	Season max kg ai/ha or (No)	
Tomato, glasshouse	Netherlands	250	SC	Foliar		0.020	(3)	1
Tomato, glasshouse	Switzerland	250	SC	Foliar		0.025	(3)	3
Triticale	France	250	SC	Foliar	0.25		(2)	42
Triticale	Germany	250	SC	Foliar	0.25		(2)	35
Triticale	Switzerland	250	SC	Foliar	0.25		(1)	–
Triticale	UK	250	SC	Foliar	0.25		(2)	Up to GS 71
Wheat	France	250	SC	Foliar	0.25		(2)	42
Wheat	Germany	250	SC	Foliar	0.25		(2)	35
Wheat	Italy	250	SC	Foliar	0.20–0.25		(2)	35
Wheat	Netherlands	250	SC	Foliar	0.25		(2)	35
Wheat	Spain	250	SC	Foliar	0.20–0.25		(2)	36
Wheat	Switzerland	250	SC	Foliar	0.25		(1)	–
Wheat	UK	250	SC	Foliar	0.25		(2)	Up to GS 71
Wheat	UK	200[f]	SC	Foliar	0.20		(2)	Up to GS 71

[a] Blueberry, currant, elderberry, gooseberry, huckleberry, lingonberry, juneberry, salal

[b] Blackberry, bingleberry, boysenberry, dewberry, lowberry, marionberry, olallieberry, youngberry, loganberry, raspberry

[c] Broccoli, Chinese broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese mustard cabbage, cauliflower, cavalo broccolo, kohlrabi

[d] Broccoli raab, Chinese cabbage, collards, kale, mizuna, mustard greens, mustard spinach, rape greens

[e] Garlic, leek, onion (bulb, green, Welsh), shallot

[f] The formulation also includes 80 g/L of cyproconazole.

[g] Cantaloupe, chayote, Chinese-waxgourd, cucumber, gourds, honeydew, melons, *Momordica* spp., muskmelon, watermelon, pumpkin, squash, zucchini

[h] Beet (garden and sugar), burdock, carrot, celeriac, chervil, chicory, ginsing, horseradish, parsley, parsnip, radish, rutabaga, salsify, skirret, turnip

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The Meeting received information on azoxystrobin supervised trials on the following crops:

Commodity	Group	Table No.
Citrus—Post-harvest	Citrus fruit	54
Citrus—Foliar		55
Cherry	Stone fruit	56
Peach		57
Plum		58
Blackberry and raspberry	Berries and small fruit	59
Blueberry		60
Cranberry		61
Grapes		62
Strawberry		63
Banana—Post-harvest	Tropical fruits—inedible peel	64
Banana—Foliar		65
Mango		66
Papaya		67
Leek	Bulb vegetables	68

Commodity	Group	Table No.
Onion bulb, dry		69
Spring onion		70
Broccoli	Brassica vegetables	71
Brussels sprouts		72
Cabbage		73
Cauliflower		74
Kohlrabi		75
Cucumber	Fruiting vegetables, cucurbits	76
Gherkin		77
Melon		78
Summer squash		79
Pepper	Fruiting vegetables other than cucurbits	80
Tomato		81
Lettuce	Leafy vegetables	82
Beans	Legume vegetables	83
Peas		84
Soybeans, dry	Pulses	85
Beetroot	Root and tuber vegetables	86
Carrot		87
Chicory		88
Potato—at planting		89
Potato—foliar		90
Radish		91
Sugar beet		92
Artichokes	Stalk and stem vegetables	93
Asparagus		94
Celery		95
Barley	Cereal grains	96
Oat		97
Rye		98
Triticale		99
Wheat		100
Maize		101
Rice		102
Almonds	Tree nuts	103
Pecans		104
Pistachios		105
Cottonseed	Oil seeds	106
Sunflower		107
Peanuts		108
Basil, chives, parley	Herbs	109
Mint		110
Soybean forage and hay	Legume animal feeds	111
Barley straw and forage	Cereal straw and forages	112
Oat straw and forage		113
Rye straw and forage		114
Triticale straw and forage		115
Wheat straw and forage		116
Maize fodder and forage		117
Rice straw		118
Sugar beet tops	Miscellaneous forages	119
Hops, dry	Dried herbs	120

Trials were generally well documented with laboratory and field reports. Laboratory reports included method validation results with procedural recoveries of samples fortified at levels similar to those occurring in samples from the supervised trials. In general, data on procedural recoveries were within the acceptable range 70–120%, with RSDs of < 20%. Dates of analyses and duration of residue sample storage prior to analyses were also provided. Field reports included data on the dates of spray applications, methods used and sampling dates. Although trials included control plots, no control data are recorded in the summary tables below unless residues in control samples exceeded the LOQ. Results reported have not been corrected for concurrent method recoveries unless indicated.

Trials conducted within the same study at the same location, time, and on the same crop variety were generally considered replicate trials (e.g. side-by-side trials with SC and WG formulations or different spray concentrations or number of applications). In most trials, duplicate or multiple field samples from replicate plots were taken at each sampling period and were analysed separately. Each value is reported in the tables and the highest value was taken as the best estimate of the residues in the replicate plots or replicate trials used in the estimation of the maximum residue levels.

When residues were not detected they are shown as below the LOQ (*e.g.* < 0.01 mg/kg). Residues, application rates and spray concentrations have generally been rounded to two significant figures or, for residues near the LOQ, to one significant figure. Residue values from the trials conducted according to maximum GAP are double underlined. Residues in edible portion used for STMR and HR estimations are single underlined.

Table 54 Azoxystrobin residues resulting from post-harvest application to citrus in the USA

CITRUS Country Year (variety)	Form g ai/L or g ai/kg	Application rate[a]	No	Commodity	PHI days	Azoxystrobin residue mg/kg	Author Date Study No
Post-harvest treatment: dip with storage wax							
		kg ai/hL					
United States, California 2001 (Marsh)	800 WG	0.12	1	Grapefruit	0	5.3, 3.0	Thompson 2004 IR4-07593
United States, Texas 2001 (Ruby Red)	800 WG	0.12	1	Grapefruit	0	2.1, 1.6	Thompson 2004 IR4-07593
United States Florida 2001 (Valencia)	800 WG	0.11	1	Orange	0	1.6, 1.3	Thompson 2004 IR4-07593
United States, California 2001 (Valencia)	800 WG	0.12	1	Orange	0	2.4, 4.0	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	0.12	1	Lemon	0	2.8, 3.5	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	0.12	1	Lemon	0	5.1, 6.6	Thompson 2004 IR4-07593
Post-harvest treatment: packing-line spray with Decco storage wax							
		kg ai /ton fruits					
United States California 2001 (Marsh)	800 WG	4.0	1	Grapefruit	0	0.98, 0.93	Thompson 2004 IR4-07593

CITRUS Country Year (variety)	Form g ai/L or g ai/kg	Application rate[a]	No	Commodity	PHI days	Azoxystrobin residue mg/kg	Author Date Study No
United States, California 2001 (Valencia)	800 WG	4.0	1	Orange	0	0.83, 1.1	Thompson 2004 IR4-07593
United States, California 2001 (Eureka)	800 WG	4.0	1	Lemon	0	1.2, 1.6	Thompson 2004 IR4-07593
Post-harvest treatment: dip without storage wax							
		kg ai/hL					
United States, California 2001 (Marsh)	800 WG	0.12	1	Grapefruit	0	1.2, 1.6	Thompson 2004 IR4-07593
United States Texas 2001 (Ruby Red)	800 WG	0.12	1	Grapefruit	0	1.5, 1.7	Thompson 2004 IR4-07593
United States Florida 2001 (Valencia)	800 WG	0.12	1	Orange	0	1.3, 1.5	Thompson 2004 IR4-07593
United States California 2001 (Valencia)	800 WG	0.12	1	Orange, whole fruit	0	2.0, 1.5	Thompson 2004 IR4-07593
				Orange, Pulp	0	0.72, 0.54	
				Orange, peel	0	5.4, 4.9	
United States, California 2001 (Eureka)	800 WG	0.12	1	Lemon	0	2.0, 2.5	Thompson 2004 IR4-07593
United States California 2001	800 WG	0.12	1	Lemon	0	1.5, 2.0	Thompson 2004 IR4-07593
Post-harvest treatment: packing-line spray without wax, followed by shipping wax							
		kg ai / ton fruit					
United States California 2001 (Marsh)	800 WG	4.0	1	Grapefruit	0	0.42, 0.55	Thompson 2004 IR4-07593
United States California 2001 (Valencia)	800 WG	4.0	1	Orange	0	0.47, 0.38	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	4.0	1	Lemon	0	0.73, 0.79	Thompson 2004 IR4-07593
Post-harvest treatment: dip with storage wax, followed by dip without wax							
		kg ai/ hL					
United States California 2001 (Ruby Red)	800 WG	0.12	2	Grapefruit	0	2.1, 2.7	Thompson 2004 IR4-07593

CITRUS Country Year (variety)	Form g ai/L or g ai/kg	Application rate[a]	No	Commodity	PHI days	Azoxystrobin residue mg/kg	Author Date Study No
United States Texas 2001 (Ruby Red)	800 WG	0.12	2	Grapefruit	0	2.9, 2.6	Thompson 2004 IR4-07593
United States California 2001 (Valencia)	800 WG	0.12	2	Orange	0	1.6, 2.2	Thompson 2004 IR4-07593
United States Florida 2001 (Valencia)	800 WG	0.12	2	Orange	0	2.1, 1.8	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	0.12	2	Lemon	0	3.7, 5.5	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	0.12	2	Lemon	0	8.3, 8.8	Thompson 2004 IR4-07593
United States California 2005 (Satsuma)	800 WG	0.12	2	Mandarin	0	3.4, 3,4	Ediger 2006 T013959-05
United States California 2005 (Satsuma)	250 SC	0.12	2	Mandarin	0	5.0, 6.2	Ediger 2006 T013959-05
United States California 2005 (Dancy)	800 WG	0.12	2	Tangerine	0	2.5, 2.6	Ediger 2006 T013959-05
United States California 2005 (Dancy)	250 SC	0.12	2	Tangerine	0	4.0, 4.2	Ediger 2006 T013959-05
Post-harvest treatment: packing-line spray with Decco 202, followed by wash with Decco Fruit and Vegetable Kleen 241, followed by packing-line spray without wax, followed by Decco 400							
		kg ai/ ton fruit					
United States California 2001 (Marsh)	800 WG	4.0	2	Grapefruit	0	0.74, 0.86	Thompson 2004 IR4-07593
United States California 2001 (Valencia)	800 WG	4.0	2	Orange	0	0.58, 0.58	Thompson 2004 IR4-07593
United States California 2001 (Eureka)	800 WG	4.0	2	Lemon	0	0.79, 0.88	Thompson 2004 IR4-07593

[a]Prior to all post-harvest applications, treated plots received two applications of a 800 WG formulation at the rate of 0.28 kg ai/ha per application at six to eight day intervals. Mature fruits were collected on the day of the final application.

The field-treated fruits were subjected to different types of post-harvest treatments:

- dip with storage wax
- packing-line spray with storage wax;
- dip without wax
- packing-line spray without wax followed by shipping wax

- dip with storage wax followed by dip without storage wax;
- packingline spray with wax storage wax followed by washing followed by packing-line spray without wax followed by shipping wax. Storage wax was applied at 10% by volume while shipping wax was applied undiluted.

Table 55 Azoxystrobin residues resulting from foliar application on citrus fruit in the USA

CITRUS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No. / max			
United States Texas, 1997 Orange (Everhard navel)	800 WG	0.28	0.06	505	6	0	0.38, 0.50	Bussey and Hampton. 1999 RR 99-012B
	800 WG	0.28	0.01	2207	6	0	0.53, 0.49	
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.01	2142	6	0	0.22, 0.23	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.01	2140	6	0	0.25, 0.31	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.01	2235	6	0	0.25, 0.32	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.04	627	6	0	0.13, 0.30	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.04	627	6	0	0.29, 0.40	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.04	627	6	0	0.13, 0.28	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Orange (Valencia)	800 WG	0.28	0.04	627	6	0	0.15, 0.34	Bussey. and Hampton 1999 RR 99-012B
United States California, 1998 Orange (Valencia)	800 WG	0.28	0.05	594	6	0	0.33, 0.37	Bussey. and Hampton 1999 RR 99-012B
United States California, 1998 Orange (Valencia)	800 WG	0.28	0.01	2104	6	0	0.39, 0.41	Bussey. and Hampton 1999 RR 99-012B
United States California, 1998 Orange (Valencia)	800 WG	0.28	0.01	2151	6	0	0.25, 0.26	Bussey. and Hampton 1999 RR 99-012B
United States Florida, 1998 Lemon (Bearss)	800 WG	0.28	0.05	608	6	0	0.74, 0.64	Hampton 1999 RR 99-018B
	800 WG	0.28	0.01	2086	6	0	0.41, 0.42	
United States Arizona, 1998	800 WG	0.28	0.01	2123	6	0	0.42, 0.52	Hampton 1999

CITRUS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No. / max			
Lemon (Ariana)								RR 99-018B
United States California, 1998 Lemon (Lisbon)	800 WG	0.28	0.05	600	6	0	0.65, 0.57	Hampton 1999 RR 99-018B
United States California, 1998 Lemon (Lisbon)	800 WG	0.28	0.01	2123	6	0	0.27, 0.31	Hampton 1999 RR 99-018B
United States California, 1998 Lemon (Lisbon)	800 WG	0.28	0.05	571	6	0	0.60, 0.54	Hampton 1999 RR 99-018B
United States Texas, 1997 Grapefruit (Rio Red)	800 WG	0.28	0.05	514	6	0	0.29, 0.29	Hampton 1999 RR 99-011B
	800 WG	0.28	0.01	2207	6	0	0.41, 0.33	
United States Florida, 1998 Grapefruit (Marsh)	800 WG	0.28	0.05	514	6	0	0.16, 0.20	Hampton 1999 RR 99-011B
United States Florida, 1998 Grapefruit (Flame)	800 WG	0.28	0.01	2104	6	0	0.25, 0.23	Hampton 1999 RR 99-011B
United States Florida, 1998 Grapefruit (White)	800 WG	0.28	0.01	2104	6	0	0.20, 0.27	Hampton 1999 RR 99-011B
United States California, 1998 Grapefruit (Marsh Rubi)	800 WG	0.28	0.05	608	6	0	0.17, 0.21	Hampton 1999 RR 99-011B
United States California, 1998 Grapefruit (Marsh)	800 WG	0.28	0.01	2150	6	0	0.17, 0.19	Hampton 1999 RR 99-011B

Table 56 Azoxystrobin residues resulting from foliar application on sweet cherry in the USA

CHERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Michigan, 1997 (Summerset)	800 WG	0.28	0.05	600	8	0	0.43, 0.50	Bussey 1998 RR 98-006B
United States California, 1997 (Bing)	800 WG	0.28	0.04	664	8	0	0.42, 0.32	Bussey 1998 RR 98-006B
United States Washington, 1997 (Bing)	800 WG	0.28	0.06	468	8	0	0.97, 1.0	Bussey 1998 RR 98-006B
United States Michigan, 1997 (Rainier)	800 WG	0.28	0.01	2217	8	0	0.38, 0.42	Bussey 1998 RR 98-006B
United States California, 1997 (Bing)	800 WG	0.28	0.01	2179	8	0	0.20, 0.20	Bussey 1998 RR 98-006B

CHERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States California, 1997 (Lambert)	800 WG	0.28	0.01	2123	8	0	0.31, 0.45	Bussey 1998 RR 98-006B
United States Michigan, 1997 (Gold)	800 WG	0.28	0.05	608	8	0	0.98, 0.89	Bussey 1998 RR 98-006B
						3	0.52, 0.31	
						6	0.25, 0.18	
						10	0.20, 0.15	
						13	0.15, 0.14	
						19	0.16, 0.11	

Table 57 Azoxystrobin residues resulting from foliar application on peach in the USA

PEACH Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Pennsylvania 1997 (Glohaven)	800 WG	0.28	0.04	673	8	0	0.62, 0.89	Bussey 1998 RR 98-009B
						7	0.39, 0.41	
United States South Carolina 1997 (Suzy-Q)	800 WG	0.28	0.06	477	8	0	0.64, 0.59	Bussey 1998 RR 98-009B
United States South Carolina 1997 (Red Haven)	800 WG	0.28	0.04	627	8	0	0.78, 0.83	Bussey 1998 RR98-009B
United States Texas, 1997 (Rio Grande)	800 WG	0.28	0.09	300	8	0	0.72, 1.4	Bussey 1998 RR98-009B
United States California, 1997 (O'Henry)	800 WG	0.28	0.05	560	8	0	0.41, 0.40	Bussey 1998 RR98-009B
United States California, 1997 (Carson)	800 WG	0.28	0.04	655	8	0	0.73, 0.59	Bussey 1998 RR98-009B
United States Pennsylvania 1997 (Red Haven)	800 WG	0.28	0.01	2067	8	0	0.60, 0.55	Bussey 1998 RR98-009B
United States Georgia, 1997 (June Gold)	800 WG	0.28	0.01	1936	8	0	0.84, 0.69	Bussey 1998 RR98-009B
United States Georgia, 1997 (O'Henry)	800 WG	0.28	0.01	2011	8	0	0.42, 0.38	Bussey 1998 RR98-009B
United States Michigan, 1997 (Harmony)	800 WG	0.28	0.01	2058	8	0	0.66, 0.86	Bussey 1998 RR98-009B
United States Michigan, 1997 (Florida King)	800 WG	0.28	0.01	1871	8	1	0.22, 0.22	Bussey 1998 RR98-009B
United States California, 1997 (Carson)	800 WG	0.28	0.01	2104	8	0	0.70, 0.74	Bussey 1998 RR98-009B

PEACH Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Georgia, 1998 (Harmony)	250 SC	0.28	0.05	560	8	0	0.19, 0.28, 0.27	Bussey 1999 RR 99-016B
	800 WG	0.28	0.05	560	8	0	0.28, 0.26, 0.23	
United States Michigan, 1998 (Red Haven)	250 SC	0.28	0.05	589	8	0	0.86, 0.73, 0.71	Bussey 1999 RR 99-016B
	800 WG	0.28	0.05	589	8	0	0.94, 0.91, 0.78	
United States California, 1998 (Loadel Clingstone)	250 SC	0.28	0.05	590	8	0	0.34, 0.25, 0.30	Bussey 1999 RR 99-016B
	800 WG	0.28	0.05	590	8	0	0.58, 0.57, 0.72	

Table 58 Azoxystrobin residues resulting from foliar application on plum in the USA

PLUM Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No. / max			
United States Michigan, 1997 (Stanley)	800 WG	0.28	0.05	589	8	0	0.24, 0.23	Bussey 1999 RR 98-010B
United States California, 1997 (Santa Rosa)	800 WG	0.28	0.05	560	8	0	0.09, 0.08	Bussey 1999 RR 98-010B
United States California, 1997 (Nubiana)	800 WG	0.28	0.05	589	8	0 7	< 0.01, 0.02 0.02, 0.01	Bussey 1999 RR 98-010B
United States Oregon, 1997 (Italian)	800 WG	0.28	0.05	589	8	0	0.23, 0.24	Bussey 1999 RR 98-010B
United States Michigan, 1997 (Stanley)	800 WG	0.28	0.01	2132	8	0	0.19, 0.30	Bussey 1999 RR 98-010B
United States California, 1997 (French)	800 WG	0.28	0.01	1964	8	0	0.39, 0.42	Bussey 1999 RR 98-010B
United States California, 1997 (French)	800 WG	0.28	0.01	1871	8	0	0.31, 0.37	Bussey 1999 RR 98-010B
United States Oregon, 1997 (Italian)	800 WG	0.28	0.01	2067	8	0	0.25, 0.22	Bussey 1999 RR 98-010B

Table 59 Azoxystrobin residues resulting from foliar application on blackberry and raspberry in the USA

CANEBERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No. / max			
United States Washington, 1999 (Raspberry, Meeker)	800 WG	0.28	0.06	431–466	7	0	0.67, 0.71	Starner 2001 06786
United States Oregon, 1999 (Raspberry, Meeker)	800 WG	0.28	0.06	470–494	6	0	2.4, 2.2	Starner 2001 06786
United States Oregon, 1999 (Blackberry, Marion)	800 WG	0.28	0.06	472–487	7	0	2.1, 3.6	Starner 2001 06786

Table 60 Azoxystrobin residues resulting from foliar application on blueberry in the USA

BLUEBERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Maine, 1998 (Wild blueberry)	800 WG	0.28	0.02	185–187	6	0	1.1, 1.6	Starner 2000 06721
United States Oregon, 1998 (Bluecrop)	800 WG	0.28	0.06	462–481	6	0	0.47, 0.52	Starner 2000 06721
United States North Carolina, 1998 (Croatan)	800 WG	0.28	0.09	310–331	6	0 7	0.85, 0.86 0.43, 0.34	Starner 2000 06721
United States North Carolina, 1998 (Croatan)	800 WG	0.28	0.09	315–329	6	0	0.89, 0.95	Starner 2000 06721
United States Michigan, 1998 (Jersey)	800 WG	0.28	0.06	458–477	6	0 7	1.0, 1.1 0.50, 0.42	Starner 2000 06721
United States Michigan, 1998 (Jersey)	800 WG	0.28	0.06	453–465	6	0	0.56, 0.79	Starner 2000 06721
United States Michigan, 1998 (Jersey)	800 WG	0.28	0.06	457–472	6	0	0.69, 1.1	Starner 2000 06721

Table 61 Azoxystrobin residues resulting from foliar application on cranberry in the USA

CRANBERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ Max seasonal rate			
United States Massachusetts, 1999 (Howes)	800 WG	0.28		2806	6	3 14	0.15, 0.14 0.15, 0.15	Thompson 2001 IR-4 06859
United States Wisconsin, 1999 (Stevens)	800 WG	0.28		187	6	3 13	0.26, 0.26 0.05, 0.05	Thompson 2001 IR-4 06859
United States Oregon, 1999 (Stevens)	800 WG	0.28		350	6	3 15	0.31, 0.26 0.15, 0.10	Thompson 2001 IR-4 06859
Canada British Columbia, 1999 (Stevens)	800 WG	0.28		375	6	3 14	0.17, 0.19 0.07, 0.08	Thompson 2001 IR-4 06859

Table 62 Azoxystrobin residues resulting from foliar application on grapes in the USA

GRAPES Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States New York	800 WG	0.28	0.04	700	6	13	0.24	Francis, Roper and Storoni

GRAPES Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
1995 (Concord)	800 WG	0.28	0.02	1870	6	13	0.22	1996 RR96-012B
United States California, 1995 (Thompson seedless)	800 WG	0.28	0.04	645	6	14	0.34	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1852	6	14	0.47	
United States California, 1995 (Thompson seedless)	800 WG	0.28	0.04	655	6	14	0.23	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1870	6	14	0.53	
United States California 1995 (Merlot)	800 WG	0.28	0.04	627	6	14	0.53	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1805	6	14	0.32	
United States California,1995 (Sauvignon Blanc)	800 WG	0.28	0.04	627	6	14	0.10	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1805	6	14	0.11	
United States California,1995 (Muscat Canneli)	800 WG	0.28	0.04	627	6	14	0.80	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1805	6	14	0.73	
United States California, 1995 (Grenache)	800 WG	0.28	0.04	627	6	14	0.36	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1805	6	14	0.62	
United States Oregon 1995 (Chardonnay)	800 WG	0.28	0.04	636	6	13	0.60	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1852	6	13	0.49	
United States Washington 1995 (White Reisling)	800 WG	0.28	0.04	636	6	13	0.23	Francis, Roper and Storoni 1996 RR96-012B
	800 WG	0.28	0.02	1852	6	13	0.53	
United States California, 1994 (Thompson Seedless)	800 WG	0.28	0.04	748	6	6	0.70	Sapiets and Roper, 1995 RJ1860B
						12	0.64	
						19	0.73	
United States California, 1994 (Chardonnay)	800 WG	0.28	0.04	767	6	7	0.36	Sapiets and Roper, 1995 RJ1860B
						14	0.27	
						21	0.33	
United States Michigan 1994 (Concord)	800 WG	0.28	0.06	458	6	7	0.35	Sapiets and Roper, 1995 RJ1860B
						14	0.30	
						21	0.30	
United States New York 1994 (Vidal)	800 WG	0.28	0.05	580	6	6	0.49	Sapiets and Roper, 1995 RJ1860B
						13	0.46	
						21	0.42	
						27	0.47	
United States Arkansas 1994 (Mars)	800 WG	0.28	0.04	776	6	7	0.16	Sapiets and Roper, 1995 RJ1860B
						13	0.13	
						19	0.16	

GRAPES Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Washington 1994 (Reisling)	800 WG	0.28	0.06	468	6	7	1.0	Sapiets and Roper, 1995 RJ1860B
						14	0.76	
						21	0.58	

Table 63 Azoxystrobin residues resulting from foliar application on strawberries in the USA

STRAWBERRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Florida, 1998 (FL-93-100)	800 WG	0.27	0.10	281	6	0	4.3, 2.8	Thompson 2000 RR 00-104B
						7	0.48, 0.67	
United States Florida, 1998 (FL-93-100)	800 WG	0.28	0.10	280	6	0	4.5, 3.8	Thompson 2000 RR 00-104B
						7	0.65, 0.51	
United States Oregon, 1998 (Totem)	800 WG	0.28	0.06	495	6	0	0.20, 0.28	Thompson 2000 RR 00-104B
United States Wisconsin, 1998 (Honeoye)	800 WG	0.28	0.17	164	6	0	0.65, 0.49	Thompson 2000 RR 00-104B
						7	0.19, 0.27	
United States California, 1998 (Chandler)	800 WG	0.28	0.09	318	7	0	0.24, 0.15	Thompson 2000 RR 00-104B
						7	0.26, 0.19	
United States California, 1998 (PS-592)	800 WG	0.28	0.03	842	6	0	1.3, 0.82	Thompson 2000 RR 00-104B
United States California, 1998 (PS-118)	800 WG	0.28	0.03	828	6	0	1.3, 1.1	Thompson 2000 RR 00-104B

Table 64 Azoxystrobin residues resulting from post-harvest application on banana in Central America (according to the US GAP)

BANANA Country Year (variety)	Form g ai/L or g ai/kg	Application rate kg ai/hL	No	Commodity	PHI days	Azoxystrobin residue mg/kg	Author Date Study No
Mexico 1998 (Grand Nain)	250 SC	0.04	1	Whole fruit	0	0.98, 0.79	Kennedy 1998 CEMR-835
				Pulp		0.03, 0.03	
Mexico 1998 (Grand Nain)	250 SC	0.04	1	Whole fruit	0	1.1, 1.0	Kennedy 1998 CEMR-835
				Pulp		0.06, 0.07	
Guatemala 1998 (Grand Nain)	250 SC	0.04	1	Whole fruit	0	0.71, 0.48	Kennedy 1998 CEMR-835
				Pulp		< 0.02, 0.02	

BANANA Country Year (variety)	Form g ai/L or g ai/kg	Application rate kg ai/hL	No	Commodity	PHI days	Azoxystrobin residue mg/kg	Author Date Study No
Guatemala 1998 (Grand Nain)	250 SC	0.04	1	Whole fruit Pulp	0	0.61, 0.82 0.03, 0.02	Kennedy 1998 CEMR-835
Costa Rica 1998 (Grand Nain)	250 SC	0.04	1	Whole fruit Pulp	0	0.85, 0.62 0.05, < 0.02	Kennedy 1998 CEMR-835
Costa Rica 1998 (Valorie)	250 SC	0.04	1	Whole fruit Pulp	0	0.57, 0.58 ≤ 0.02, < 0.02	Kennedy 1998 CEMR-835

Table 65 Azoxystrobin residues resulting from foliar application on bananas in the USA

BANANA Country Year (variety)	Application				PHI days	Commodity	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	Water, L/ha	No. / max				
Bagged								
United States Florida, 1995 (Hawaii)	800 WG	0.15	280	8	0	Whole fruit Pulp	0.03, 0.05 < 0.01, ≤ 0.01	Roper 1996 RR96-050B
United States Hawaii, 1995 (Valarie)	800 WG	0.15	243	8	0	Whole fruit Pulp	0.01, < 0.01 ≤ 0.01, < 0.01	Roper 1996 RR96-050B
United States Hawaii, 1995 (Williams)	800 WG	0.15	187	8	0	Whole fruit Pulp	0.01, 0.02 < 0.01, ≤ 0.01	Roper 1996 RR96-050B
United States Hawaii, 1995 (Williams)	800 WG	0.15	224	8	0	Whole fruit Pulp	0.05, 0.05 0.01, < 0.01	Roper 1996 RR96-050B
United States Hawaii, 1995 (Williams)	800 WG	0.15	187–256	8	0	Whole fruit Pulp	0.02, 0.02 ≤ 0.01, < 0.01	Roper 1996 RR96-050B
Puerto Rica, 1995 (Grand Nain)	800 WG	0.15	243	8	0	Whole fruit Pulp	0.11, 0.15 0.01, 0.01	Roper 1996 RR96-050B
Unbagged								
United States Florida, 1995 (Hawaii)	800 WG	0.15	280	8	0	Whole fruit Pulp	0.08, 0.11 < 0.01, ≤ 0.01	Roper 1996 RR96-050B
United States Hawaii, 1995 (Valarie)	800 WG	0.15	243	8	0	Whole fruit Pulp	0.17, 0.18 0.02, 0.02	Roper 1996 RR96-050B
United States Hawaii, 1995 (Williams)	800 WG	0.15	187	8	0	Whole fruit Pulp	0.10, 0.10 ≤ 0.01, < 0.01	Roper 1996 RR96-050B

BANANA Country Year (variety)	Application				PHI days	Commodity	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	Water, L/ha	No. / max				
United States Hawaii, 1995 (Williams)	800 WG	0.15	224	8	0	Whole fruit	0.15, 0.26	Roper 1996 RR96-050B
						Pulp	< 0.01, < 0.01	
United States Hawaii, 1995 (Williams)	800 WG	0.15	187–256	8	0	Whole fruit	0.23, 0.26	Roper 1996 RR96-050B
						Pulp	0.03, 0.03	
Puerto Rica, 1995 (Grand Nain)	800 WG	0.15	243	8	0	Whole fruit	0.13, 0.17	Roper 1996 RR96-050B
						Pulp	< 0.01, 0.02	

Table 66 Azoxystrobin residues resulting from foliar application on mango in Brazil, South Africa, and the USA

MANGO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Brazil 2003 (Palmer)	500 WG	0.064	0.008	800	6	0	0.07, 0.07	Casagrande 2004 MO0359
						1	0.06, 0.06	
						2	0.05, 0.06	
						5	0.05, 0.05	
						10	0.04. 0.04	
	500 WG	0.16	0.02	800	6	0	0.12, 0.13	
						1	0.12, 0.13	
						2	0.11, 0.12	
						5	0.10, 0.13	
						10	0.06, < 0.01	
Brazil 2003 (Palmer)	500 WG	0.064	0.008	800	6	0	0.13, 0.12	Casagrande 2004 MO0359
						1	0.12, 0.09	
						2	0.09, 0.08	
						5	0.08, 0.09	
						10	0.13, 0.05	
	500 WG	0.16	0.02	800	6	0	0.20, 0.19	
						1	0.22, 0.22	
						2	0.21, 0.18	
						5	0.13, 0.19	
						10	0.12, 0.13	
Brazil 2003 (Palmer)	500 WG	0.064	0.008	800	6	0	0.13, 0.16	Casagrande 2004 MO0359
						1	0.14, 0.14	
						2	0.06, 0.06	
						5	0.08, 0.06	
						10	0.03, 0.03	
	500 WG	0.16	0.02	800	6	0	0.32, 0.23	
						1	0.33, 0.38	
						2	0.33, 0.13	
						5	0.16, 0.16	
						10	0.05, 0.05	
Brazil 2001 (Tommy Atkins)	500 WG	0.064	0.008	800	8	2	0.03	Francisco 2002 SAM 1675
		0.16	0.02	800	8	2	0.15	
Brazil 2001 (Tommy Atkins)	500 WG	0.064	0.008	800	8	2	0.07	Francisco 2002 SAM 1675
		0.16	0.02	800	8	2	0.12	

MANGO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max				
Brazil 2001 (Tommy Atkins)	500 WG	0.064	0.008	800	8	0	0.04		Francisco 2002 SAM 1675
						1	0.05		
						2	0.05		
						3	0.04		
						4	0.06		
	500 WG	0.16	0.02	800	8	2	0.09		
South Africa 2002 (Tommy Atkins)	250 SC		0.01		2		Whole fruit:	Flesh:	McGill 2004 02-6088
						0	0.03	< 0.01	
						7	0.02	< 0.01	
						10	0.02	< 0.01	
						14	0.01	< 0.01	
						21	0.02	< 0.01	
South Africa 2002 (Kent)	250 SC		0.01		2		Whole fruit:	Flesh:	McGill 2004 02-6089
						0	0.05	0.01	
						7	0.09	< 0.01	
						10	0.08	< 0.01	
						14	0.06	< 0.01	
						21	0.06	< 0.01	
South Africa 2002 (Tommy Atkins)	250 SC		0.01		2		Whole fruit:	Flesh:	McGill 2004 02-6090
						0	0.08	< 0.01	
						21	0.03	< 0.01	
			0.02		2		Whole fruit:	Flesh:	
						0	0.13	< 0.01	
						21	0.07	< 0.01	
South Africa 2002 (Keith)	250 SC		0.01		2		Whole fruit:	Flesh:	McGill 2004 02-6091
						0	0.12	< 0.01	
						21	0.06	< 0.01	
			0.02		2		Whole fruit:	Flesh:	
						0	0.20	0.03	
						21	0.09	< 0.01	
United States Florida, 1998 (Kent)	800 WG	0.28			6	0	0.18, 0.31		Thompson 2000 IR-4 PR 06867
United States Florida, 1998 (Kent)	800 WG	0.28			6	0	0.09, 0.05		Thompson 2000 IR-4 PR 06867
United States Florida, 1998 (Tommy Atkins)	800 WG	0.28			6	0	0.41, 0.48		Thompson 2000 IR-4 PR 06867

Note: In Brazilian trials, azoxystrobin was analysed in fruit after removal of stone and the results calculated on whole fruit. In South African trials, whole mango fruit residues were calculated from residues in peel, flesh, and stone, using the weight of each part, compared to the weight of the whole mango fruit. In the US trials, azoxystrobin residues were determined in mango halves (stone removed).

Table 67 Azoxystrobin residues resulting from foliar application on papaya in Brazil and Malaysia

PAPAYA Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max		Whole fruit	Flesh	
Brazil 2002 (Golden)	500 WG	0.08	0.01	800	6	0[a] 0 3 7 10 14	0.09 0.15 <u>0.12</u> 0.08 0.10 0.08		McGill 2004 02-6033
	500 WG	0.16	0.02	800	6	0[a] 0 3 7 10 14	0.15 0.28 0.20 0.13 0.12 0.13		
Brazil 2002 (Golden)	500 WG	0.08	0.01	800	6	0[a] 0 3 7 10 14	0.05 0.14 <u>0.09</u> 0.06 0.06 0.04	0.02 0.02 <u>0.01</u> < 0.01 < 0.01 < 0.01	McGill 2004 02-6034
	500 WG	0.16	0.02	800	6	0[a] 0 3 7 10 14	0.04 0.34 0.27 0.15 0.17 0.14	0.01 0.07 0.05 0.02 0.02 0.03	
Brazil 2002 (Taiwan)	500 WG	0.08	0.01	800	6	0[a] 0 3 7 10 14	0.07 0.16 <u>0.11</u> 0.08 0.08 0.06		McGill 2004 02-6037
	500 WG	0.16	0.02	800	6	0[a] 0 3 7 10 14	0.13 0.49 0.21 0.16 0.12 0.07		
Brazil 2002 (Golden)	500 WG	0.08	0.01	800	6	0[a] 0 3 7 10 14	0.05 0.07 <u>0.06</u> 0.04 0.04 0.04	0.01 0.01 <u>0.02</u> < 0.01 < 0.01 < 0.01	McGill 2004 02-6038
	500 WG	0.16	0.02	800	6	0[a] 0 3 7 10 14	0.18 0.27 0.20 0.16 0.12 0.07	0.03 0.04 0.04 0.03 0.02 0.01	

	Application						Azoxystrobin residue, mg/kg		
Malaysia 2005 (Exotica III)	250 SC	0.11	0.011	1000	2	–1 0 1 3 7 13	< 0.05 0.08 <u>0.15</u> 0.12 0.07 0.07		Keong 2005 MYF22005B
	250 SC	0.23	0.023	1000	2	–1 0 1 3 7 13	0.07 0.28 0.27 0.16 0.08 0.19		
Malaysia 2006 (Exotica III)	250 SC	0.11	0.011	1000	2	–1 0 1 3 5 7 10 14	< 0.05 < 0.05 <u>≤ 0.05</u> < 0.05 < 0.05 < 0.05 < 0.05 < 0.05		Keong 2006 AZX/PPY/2006/ BT/001
Malaysia 2006 (Exotica III)	250 SC	0.11	0.011	1000	2	–1 0 1 3 5 7 10 14	< 0.05 < 0.05 <u>≤ 0.05</u> < 0.05 < 0.05 < 0.05 < 0.05 < 0.05		Keong 2006 AZX/PPY/2006/ BT/004

[a] Before final application

Table 68 Azoxystrobin residues in leeks from supervised trials in Europe

LEEKS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France (South) 2003 (Harston F1)	250 SC	0.25	0.06	400	3	0[a]	0.41	Sole 2004 03-6000
						0	1.42	
						7	1.2	
						13	<u>1.2</u>	
						21	0.66	
						28	0.23	
						36	0.19	
France (South) 2003 (Upton)	250 SC	0.25	0.08	300	3	0[a]	0.10	Sole 2004 03-6034
						0	1.07	
						7	0.21	
						15	<u>0.06</u>	
						22	0.03	
						29	0.01	
						35	< 0.01	
France (South) 2003 (Primera)	250 SC	0.25	0.06	400	3	0[a]	0.24	Sole 2004 03-6035
						0	1.4	
						7	0.22	
						14	<u>0.14</u>	
						21	0.08	
						28	0.04	
						35	0.02	

LEEKS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France (South) 2002 (Kenton)	250 SC	0.25	0.08	303	3	0[a]	0.25	Kang 2004 CEMR-1966
						0	1.6	
						7	0.35	
						14	0.17	
						21	0.09	
Switzerland 2003 (Prelina)	250 SC	0.26	0.05	525	3	0[a]	0.16	Sole 2004 03-6036
						0	1.8	
						7	0.23	
						14	0.07	
						21	0.01	
						28	0.01	
						35	< 0.01	
Switzerland 2003 (Shelton)	250 SC	0.25	0.05	500	3	0[a]	0.20	Sole 2004 03-6037
						0	3.4	
						7	1.4	
						14	0.19	
						21	0.03	
						28	0.02	
						35	0.01	
France (North) 2002 (Fiesta)	250 SC	0.25	0.06	400	3	0[a]	0.17	Kang 2004 CEMR-1964
						0	1.6	
						7	0.35	
						14	0.10	
						21	0.09	
						29	0.05	
						35	0.04	
France (North) 2002 (Portura)	250 SC	0.25	0.06	400	3	0[a]	1.4	Kang 2004 CEMR-1965
						0	1.9	
						7	0.44	
						14	0.14	
						21	0.07	
						28	0.05	
						35	0.05	
Germany 2002 (Almera)	250 SC	0.24	0.06	384	3	0[a]	0.28	Kang 2004 CEMR-1970
						0	2.9	
						7	0.35	
						14	0.13	
						21	0.07	
						28	0.05	
						35	0.06	
Germany 2002 (Davinci)	250 SC	0.25	0.06	400	3	0[a]	0.39	Kang 2004 CEMR-1971
						0	1.9	
						7	0.55	
						14	0.64	
						21	0.19	
						28	0.15	
						35	0.11	
United Kingdom 2002 (Farinto)	250 SC	0.26	0.06	420	3	0[a]	0.30	Kang 2004 CEMR-1968
						0	< 0.01	
						7	0.15	
						14	0.11	
						21	0.08	
						28	0.06	
						35	0.05	

LEEKS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United Kingdom 2002 (Goliath)	250 SC	0.25	0.06	400	3	0[a]	2.7	Kang 2004 CEMR-1969
						0	4.5	
						7	0.96	
						14	0.34	
						21	0.19	
						28	0.07	
						35	0.06	

[a] Before final application

Table 69 Azoxystrobin residues in dry onion bulb from supervised trials in the USA

BULB ONION, DRY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States New York, 1998 (Agrow Crusader)	800 WG	0.28	0.17	168	6	0	0.43, 0.66	Bussey 1999 RR99-042B
United States Illinois, 1998 (Yellow Spanish)	800 WG	0.28	0.20	140	6	0	0.18, 0.21	Bussey 1999 RR99-042B
United States Texas, 1998 (Texas early white)	800 WG	0.28	0.27	103	6	0	0.38, 0.51	Bussey 1999 RR99-042B
United States Colorado, 1998 (Valent)	800 WG	0.28	0.20	140	6	0	0.31, 0.28	Bussey 1999 RR99-042B
United States California, 1998 (White sweet Spanish)	800 WG	0.28	0.20	140	6	0	≤ 0.01, < 0.01	Bussey 1999 RR99-042B
United States California, 1998 (Stockton Red)	800 WG	0.28	0.20	140	6	0	0.13, 0.15	Bussey 1999 RR99-042B
United States Oregon, 1998 (DPSX-1062)	800 WG	0.28	0.16	178	6	0	0.36, 0.20	Bussey 1999 RR99-042B
United States Washington 1998 (Candi)	800 WG	0.28	0.16	178	6	0	0.06, 0.07	Bussey 1999 RR99-042B

Table 70 Azoxystrobin residues in spring onion from supervised trials in the USA

SPRING ONION Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Texas, 1998 (Texas Grano 1015y)	800 WG	0.28	0.29	98	6	0	4.7, 6.3	Bussey 1999 RR98-074B
United States Arizona 1998 (Tokyo)	800 WG	0.28	0.17	168	11	0	3.1, 3.3	Bussey 1999 RR98-074B
United States California, 1998 (White Sweet Bunching)	800 WG	0.28	0.20	140	6	0	1.4, 1.4	Bussey 1999 RR98-074B
United States New York, 2001 (Stuttgartter)	800 WG	0.28	0.17	168	6	0	1.1, 1.3	Ediger 2002 493-01
	250 SC	0.28	0.17	168	6	0	0.92, 1.1	
United States Texas, 2001 (Rio Blanco Grande)	800 WG	0.28	0.17	160	6	0	1.4, 1.3	Ediger 2002 493-01
	250 SC	0.28	0.17	160	6	0	1.6, 2.2	
United States California, 2001 (White Lisbon)	800 WG	0.28	0.19	150	6	0	2.6, 2.0	Ediger 2002 493-01
	250 SC	0.28	0.19	150	6	0	2.7, 1.2	
United States Illinois, 2001 (Walla Sweet)	800 WG	0.28	0.21	131	6	0	0.67, 0.49	Ediger 2002 493-01
	250 SC	0.28	0.21	131	6	0	0.23, 0.14	

Table 71 Azoxystrobin residues in broccoli from supervised trials in Europe, Canada, and the USA

BROCCOLI Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Netherlands 2004 (Monaco)	250 SC	0.25	0.05	495	2	0[a] 0 3 7 10 14	< 0.01 3.0 1.2 0.25 0.10 0.04	Benazeraf 2005 04-0407
Netherlands 2004 (Monaco)	250 SC	0.25	0.05	498	2	0[a] 0 3 7 10 14	0.02 1.4 0.27 0.04 0.03 0.01	Benazeraf 2005 04-0407
Germany 2004 (Marathon)	250 SC	0.26	0.05	509	2	14	< 0.01	Elliott 2005 05-6000
Germany 2004	250 SC	0.25	0.08	320	2	14	< 0.01	Elliott 2005 05-6000

BROCCOLI Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 2005 (Maraton)	250 SC	0.25	0.05	503	2	0[a] 0 3 7 10 14	2.2[b] 3.6[b] 3.2[b] 0.67 0.56 0.58	Benazeraf 2005 04-0604
Spain 2005 (Monaco)	250 SC	0.25	0.05	503	2	0[a] 0 3 7 10 14	4.4[b] 4.5[b] 3.6[b] 0.34 0.25 0.11	Benazeraf 2005 04-0604
Spain 2005 (Marathon)	250 SC	0.26	0.05	510	2	0[a] 0 3 7 10 14	0.02 0.42 0.25 0.09 0.06 0.04	Bour 2006 05-0302
Spain 2005 (Chevalier)	250 SC	0.26	0.05	509	2	0[a] 0 3 7 10 14	0.01 0.66 0.32 0.11 0.06 0.04	Bour 2006 05-0302
Canada, ON 1999	800 WG	0.28	0.07	402	6	0 3 7	0.55, 0.93 0.21, 0.29 0.07, 0.09	Starner 2002 07096
Canada, BC 1999	800 WG	0.28	0.05	515	6	0	1.1, 1.5	Starner 2002 07096
United States California 1999 (Patriot)	800 WG	0.28	0.04	673	6	0 4 6	2.3, 1.9 0.27, 0.20 0.09, 0.08	Starner 2002 07096
United States California 1999 (Green Belt)	800 WG	0.28	0.09	309	6	0	0.25, 0.13	Starner 2002 07096

[a] Before final application

[b]Residues in whole plant (otherwise in broccoli heads).

Table 72. Azoxystrobin residues in Brussels sprouts from supervised trials in Europe

BRUSSELS SPROUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France 2001 (Cyrus)	250 SC	0.25	0.06	400	4	0[a]	0.03	Unsworth 2002 1983/030-D2149
						0	0.08	
						3	0.06	
						7	0.09	
						14	0.03	
						21	0.04	
	250 SC	0.25	0.06	400	2	0[a]	0.02	
						0	0.08	
						3	0.04	
						7	0.02	

BRUSSELS SPROUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
						14	0.03	
						21	0.02	
France 2001 (Oliver)	250 SC	0.25	0.06	400	4	0[a]	0.23	Unsworth 2002 1983/030-D2149
						0	0.40	
						3	0.33	
						7	0.27	
						14	0.18	
						21	0.12	
	250 SC	0.25	0.06	400	2	0[a]	0.03	
						0	0.17	
						3	0.19	
						7	0.13	
						14	0.16	
						21	0.03	
Spain 2002 (Oliver)	250 SC	0.26	0.05	510	2	0[a]	0.02	McGill 2003 02-6101
						0	0.08	
						3	0.14	
						7	0.11	
						14	0.06	
						21	0.04	
	250 SC	0.26	0.05	510	4	0[a]	0.08	
						0	0.17	
						3	0.16	
						7	0.15	
						14	0.14	
						21	0.06	
Spain 2002 (Oliver)	250 SC	0.26	0.05	514	2	0[a]	0.02	McGill 2003 02-6102
						0	0.18, 0.16	
						3	0.05	
						7	0.09, 0.10	
						14	0.05	
						21	0.04	
	250 SC	0.26	0.05	510	4	0[a]	0.02	
						0	0.16, 0.15	
						3	0.09	
						7	0.12, 0.14	
						14	0.05	
						21	0.05	
Germany 2001 (Icarus)	250 SC	0.26	0.05	510	4	0[a]	0.10	Unsworth 2002 1983/031-D2149
						0	0.25	
						3	0.15	
						7	0.07	
						10	0.04	
						14	0.04	
						21	0.05	
	250 SC	0.25	0.05	503	2	0[a]	0.08	
						0	0.19	
						3	0.08	
						7	0.06	
						10	0.05	
						14	0.04	
						21	0.02	

BRUSSELS SPROUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Germany 2001 (Icarus)	250 SC	0.29	0.05	570	4	0[a]	0.05	Unsworth 2002 1983/031-D2149
						0	0.19	
						3	0.14	
						7	0.02	
						10	0.02	
						14	0.03	
						21	0.01	
	250 SC	0.28	0.05	557	2	0[a]	0.03	
						0	0.11	
						3	0.07	
						7	0.02	
						10	0.02	
						14	0.02	
						21	< 0.01	
Germany 2001 (Icarus)	250 SC	0.26	0.05	515	4	0[a]	0.05	Unsworth 2002 1983/031-D2149
						0	0.62	
						3	0.23	
						6	0.21	
						10	0.10	
						13	0.18	
						20	0.04	
	250 SC	0.27	0.05	534	2	0[a]	0.04	
						0	0.62	
						3	0.23	
						6	0.22	
						10	0.10	
						13	0.04	
						20	0.02	
Austria 2001 (Oliver)	250 SC	0.25	0.05	525	4	0[a]	0.04	Mills 2002 1983/032-D2149
						0	0.22	
						3	0.09	
						7	0.08	
						11	0.05	
						14	0.05	
						20	0.04	
	250 SC	0.25	0.05	524	2	0[a]	0.03	
						0	0.20	
						3	0.08	
						7	0.06	
						11	0.04	
						14	0.04	
						20	0.03	
United Kingdom 2002 (Hellemus)	250 SC	0.25	0.06	400	4	0[a]	0.05	Unsworth 2002 1983/033-D2149
						0	0.10	
						3	0.05	
						7	0.06	
						14	0.04	
						21	0.02	
	250 SC	0.25	0.06	400	2	0[a]	0.02	
						0	0.09	
						3	0.04	
						7	0.02	
						14	0.02	
						20	0.01	

BRUSSELS SPROUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United Kingdom 2002 (Hellemus)	250 SC	0.25	0.06	400	2	0[a]	0.02	Unsworth 2002 1983/033-D2149
						0	0.12	
						3	0.04	
						7	0.02	
						14	0.02	
						21	0.01	
	250 SC	0.25	0.06	400	4	0[a]	0.02	
						0	0.27	
						3	0.03	
						7	0.03	
						14	0.04	
						21	0.02	
Netherlands 2002 (Abacus)	250 SC	0.25	0.05	492	2	0[a]	0.05	Kang 2003 CEMR-1962
						0	0.14	
						2	0.09	
						7	0.07	
						15	0.03	
						21	0.03	
	250 SC	0.25	0.05	490	4	0[a]	0.01	
						0	0.14	
						2	0.17	
						7	0.16	
						15	0.08	
						21	0.06	
Netherlands 2002 (Maximus)	250 SC	0.24	0.05	483	2	0	0.16	Kang 2003 CEMR-1963
						3	0.09	
						7	0.11	
						14	0.05	
						20	0.02	
	250 SC	0.24	0.05	472	4	0	0.15	
						3	0.10	
						7	0.14	
						14	0.06	
						20	0.04	

[a] Before final application

Table 73 Azoxystrobin residues in cabbage from supervised trials in Europe, Canada, and the USA

CABBAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 2000 (Savoy King)	250 SC	0.25		513	4	0[a]	0.07	McGill 2001 RJ3179B
						0	1.3	
						7	0.14	
						10	0.22	
						14	0.05	
						20	0.04	
	250 SC	0.25		595	2	0[a]	0.02	
						0	0.89	
						7	0.13	
						10	0.06	
						14	0.07	
						20	0.02	

CABBAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 2000 (Retosa)	250 SC	0.25		470	4	0[a]	< 0.01	McGill 2001 RJ3179B
						0	0.31	
						7	0.01	
						10	< 0.01	
						14	< 0.01	
						21	< 0.01	
	250 SC	0.25		545	2	0[a]	< 0.01	
						0	0.27	
						7	0.01	
						10	< 0.01	
						14	0.01	
						21	< 0.01	
Italy 2001 (ELX 60 91)	250 SC	0.25		405	4	0[a]	< 0.01	Unsworth 2002 1983/034-D2149
						0	0.02	
						7	< 0.01	
						10	0.03	
						14	≤ 0.01	
						21	< 0.01	
	250 SC	0.25		413	2	0[a]	< 0.01	
						0	0.03	
						7	< 0.01	
						10	< 0.01	
						14	< 0.01	
						21	< 0.01	
Italy 2001 (Rigoletto)	250 SC	0.25		403	4	0[a]	0.02	Unsworth 2002 1983/034-D2149
						0	0.17	
						7	0.13	
						10	0.07	
						14	0.17	
						21	0.18	
	250 SC	0.25		407	2	0[a]	< 0.01	
						0	0.15	
						7	0.10	
						10	0.08	
						14	0.05	
						21	0.03	
Netherlands 2000 (Eton)	250 SC	0.25		255	4	0	0.05	McGill 2001 RJ3180B
						6	0.02	
						10	< 0.01	
						15	≤ 0.01	
						22	< 0.01	
	250 SC	0.25		250	2	0	0.03	
						6	0.02	
						10	< 0.01	
						15	< 0.01	
						22	< 0.01	
Netherlands 2000 (Lennox)	250 SC	0.25		257	4	0	0.02	McGill 2001 RJ3180B
						6	< 0.01	
						10	< 0.01	
						15	≤ 0.01	
						22	< 0.01	
	250 SC	0.25		253	2	0	0.01	
						6	< 0.01	
						10	< 0.01	
						15	< 0.01	
						22	< 0.01	

CABBAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Germany 2000 (Alaska)	250 SC	0.25		600	4	0	0.12	Richards 2001 RJ3191B
						6	0.09	
						11	< 0.01	
						14	0.01	
						22	< 0.01	
	250 SC	0.25		600	2	0	0.12	
						6	0.06	
						11	< 0.01	
						14	< 0.01	
						22	< 0.01	
Germany 2000 (Subaro)	250 SC	0.25		600	4	0	0.03	Richards 2001 RJ3191B
						6	0.02	
						9	< 0.01	
						13	≤ 0.01	
						22	< 0.01	
	250 SC	0.25		600	2	0	0.05	
						6	< 0.01	
						9	0.01	
						13	< 0.01	
						22	< 0.01	
Germany 2001 (Castello)	250 SC	0.25		590	4	0[a]	0.01	Unsworth 2002 1983/035-D2149
						0	0.10	
						3	0.01	
						7	0.01	
						10	< 0.01	
						14	≤ 0.01	
						21	< 0.01	
	250 SC	0.25		590	2	0[a]	0.02	
						0	0.11	
						3	0.01	
						7	< 0.01	
						10	0.01	
						14	< 0.01	
						21	< 0.01	
Germany 2001 (Castello)	250 SC	0.25		510	4	0[a]	< 0.01	Unsworth 2002 1983/035-D2149
						0	0.03	
						3	0.04	
						7	< 0.01	
						10	< 0.01	
						14	≤ 0.01	
						21	< 0.01	
	250 SC	0.25		510	2	0[a]	< 0.01	
						0	0.06	
						3	0.04	
						7	< 0.01	
						10	< 0.01	
						14	< 0.01	
						21	< 0.01	

CABBAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Germany 2001 (Castello	250 SC	0.25		529	4	0[a]	0.02	Unsworth 2002 1983/035-D2149
						0	0.13	
						3	0.07	
						7	0.02	
						10	0.02	
						14	≤ 0.01	
						21	< 0.01	
	250 SC	0.25		505	2	0[a]	< 0.01	
						0	0.08	
						3	0.04	
						7	0.03	
						10	0.02	
						14	< 0.01	
						21	< 0.01	
Austria 2001 (Colmar)	250 SC	0.25		515	4	0[a]	0.03	Mills, 2002 1983/036-D2149
						0	0.54	
						3	0.19	
						6	0.11	
						9	0.10	
						14	0.08	
						22	0.09	
	250 SC	0.25		504	2	0[a]	0.03	
						0	0.24	
						3	0.09	
						6	0.08	
						9	0.09	
						14	0.06	
						22	0.02	
Canada, ON 1999	800 WG	0.28		402	6	0	1.8 (w/ wrapper leaves) 0.18 (w/out wrapper leaves)	Starner 2002 07095
Canada, NS 1999	800 WG	0.28		608	6	0	2.0 (w/ wrapper leaves) 0.17 (w/out wrapper leaves)	Starner 2002 07095
United States Florida, 1999 (Super Red 80 F1)	800 WG	0.28		290	6	0	0.90 (w/ wrapper leaves)	Starner 2002 07095
						0	0.10 (w/out wrapper leaves)	
United States Wisconsin, 1999 (Grandslam)	800 WG	0.28		310	6	0	0.32 (w/wrapper leaves)	Starner 2002 07095
						0	0.03 (w/out wrapper leaves)	

[a] Before final application

Table 74 Azoxystrobin residues in cauliflower from supervised trials in Europe

CAULIFLOWER Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
Spain 2000 (Fremon)	250 SC	0.25	0.05	433	4	0[a]	< 0.01	McGill 2001 RJ3178B
						0	0.07	
						7	0.01	
						10	< 0.01	
						15	<u>≤ 0.01</u>	
						21	< 0.01	
	250 SC	0.24	0.05	485	2	0[a]	< 0.01	
						0	0.05	
						7	< 0.01	
						10	< 0.01	
						15	< 0.01	
						21	< 0.01	
Spain 2000 (Cabrera)	250 SC	0.24	0.05	460	4	0[a]	0.01	McGill 2001 RJ3178B
						0	0.56	
						6	0.15	
						9	0.31	
						13	<u>0.44</u>	
						19	0.20	
	250 SC	0.24	0.05	533	2	0[a]	0.02	
						0	0.49	
						6	0.29	
						9	0.15	
						13	0.23	
						19	0.08	
Spain 2001 (Nautilus)	250 SC	0.25	0.06	450	4	0[a]	< 0.01	Mills 2002 1983/038- D2149
						0	0.05	
						7	< 0.01	
						10	< 0.01	
						14	<u>≤ 0.01</u>	
						21	< 0.01	
	250 SC	0.25	0.05	550	2	0[a]	< 0.01	
						0	0.02	
						7	< 0.01	
						10	< 0.01	
						14	< 0.01	
						21	< 0.01	
Spain 2001 (Fremont)	250 SC	0.25	0.06	450	4	0[a]	< 0.01	Mills 2002 1983/038- D2149
						0	0.44	
						7	0.07	
						10	0.03	
						14	0.01	
						21	0.02	
	250 SC	0.25	0.05	500	2	0[a]	< 0.01	
						0	0.42	
						7	0.06	
						10	0.04	
						14	<u>0.03</u>	
						21	< 0.01	
Germany 2000 (Fremont F1)	250 SC	0.25	0.04	600	4	0	0.65	Richards 2001 RJ3192B
						6	0.20	
						9	<u>0.04</u>	
						13	0.02	
						20	< 0.01	
	250 SC	0.25	0.04	600	2	0	0.43	
						6	0.10	
						9	0.03	
						13	0.01	

CAULIFLOWER Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
						20	0.02	
Germany 2000 (Fremont)	250 SC	0.25	0.04	600	4	0	0.18	Richards 2001 RJ3192B
						8	< 0.01	
						11	≤ 0.01	
						13	< 0.01	
						21	< 0.01	
	250 SC	0.25	0.04	600	2	0	0.20	
						8	0.02	
						11	< 0.01	
						13	< 0.01	
						21	0.01	
United Kingdom 2001 (Sebini)	250 SC	0.27	0.06	437	4	0[a]	< 0.01	Mills 2002 1983/037- D2149
						0	< 0.01	
						7	< 0.01	
						10	≤ 0.01	
						13	< 0.01	
						21	< 0.01	
	250 SC	0.26	0.06	420	2	0[a]	< 0.01	
						0	0.02	
						7	< 0.01	
						10	< 0.01	
						13	< 0.01	
						21	< 0.01	
Germany 2001 (Fremont)	250 SC	0.29	0.05	590	4	0[a]	< 0.01	Unsworth 2002 1983/039- D2149
						0	0.18	
						3	0.28	
						7	0.07	
						10	0.06	
						14	0.05	
						21	0.01	
	250 SC	0.29	0.05	587	2	0[a]	< 0.01	
						0	0.20	
						3	0.17	
						7	0.07	
						10	0.07	
						14	0.02	
						21	< 0.01	
Germany 2001 (Fremont)	250 SC	0.25	0.05	502	4	0[a]	0.01	Unsworth 2002 1983/039- D2149
						0	0.57	
						3	0.27	
						7	0.15	
						10	0.17	
						14	0.05	
						21	0.05	
	250 SC	0.25	0.05	493	2	0[a]	0.04	
						0	0.67	
						3	0.21	
						7	0.13	
						10	0.11	
						14	0.05	
						21	0.05	
Germany 2001 (Fremont)	250 SC	0.25	0.05	500	4	0[a]	0.23	Unsworth 2002 1983/039- D2149
						0	0.84	
						3	0.30	
						7	0.36	
						10	0.42	
						14	0.15	
						21	0.11	

CAULIFLOWER Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	250 SC	0.25	0.05	507	2	0[a]	0.29	
						0	0.65	
						3	0.31	
						7	0.26	
						10	0.26	
						14	0.13	
						21	0.14	
Germany 2001 (Fremont)	250 SC	0.26	0.05	520	4	0[a]	0.06	Unsworth 2002 1983/039- D2149
						0	0.94	
						3	0.69	
						7	0.48	
						10	0.34	
						14	0.27	
						21	0.04	
	250 SC	0.26	0.05	517	2	0[a]	0.01	
						0	0.91	
						3	0.54	
						7	0.46	
						10	0.46	
						14	0.14	
						21	0.08	
Austria 2001 (Whitney F1)	250 SC	0.25	0.05	505	4	0[a]	< 0.01	Mills 2002 1983/040- D2149
						0	0.14	
						3	0.04	
						7	0.03	
						10	0.04	
						14	0.02	
						21	0.02	
	250 SC	0.25	0.05	505	2	0[a]	< 0.01	
						0	0.05	
						3	0.16	
						7	0.03	
						10	0.03	
						14	0.03	
						21	0.02	

[a] Before final application

Table 75 Azoxystrobin residues in kohlrabi from supervised trials in Germany

KOHLRABI Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
Germany 1999 (Avanti)	250 SC	0.25	0.04	600	2	0	0.16	Dissemond 2001 GLP 99/021
						7	0.10	
						14	0.06	
						21	0.04	
Germany 1999 (Avanti)	250 SC	0.25	0.04	600	2	0	0.35	Dissemond 2001 GLP 99/020
						7	0.10	
						14	0.05	
						21	0.03	
Germany 2001 (Latin)	250 SC	0.27	0.04	610	2	0	3.8	Fuchsbichler 2002 HVA 13/02
						7	0.02	
						14	≤ 0.02	
						21	< 0.02	
						28	< 0.02	
Germany	250 SC	0.25	0.06	400	2	0	0.33	Fuchsbichler

						7	0.06	
						14	0.03	
						21	< 0.02	
						28	< 0.02	
Germany 2001 (Cindy)	250 SC	0.25	0.04	600	2	14	0.04	Fuchsbichler 2002 HVA 13/02
						21	< 0.02	
						28	< 0.02	
Germany 2001 (Cindy)	250 SC	0.25	0.04	600	2	14	0.09	Fuchsbichler 2002 HVA 13/02
						21	0.02	
						28	< 0.02	

Table 76 Azoxystrobin residues in cucumber from supervised trials indoors (glasshouse) in Europe and outdoors in Europe and the USA

CUCUMBER Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Indoor trials (glasshouse)								
Germany 1996 (Danora)	250 SC		0.020		4	0	0.18	Burke 1997 RJ2211B
						1	0.23	
						3	0.13	
						7	0.08	
Germany 1995 (Banza 90% and Cordoba 10%)	250 SC		0.020		4	0	0.22	Ryan 1996 RJ2139B
						1	0.19	
						3	0.13	
						7	0.06	
United Kingdom, 1995 (Corona)	250 SC		0.020		8	3	0.44	Sapiets 1996 RJ2169B
						7	0.75	
United Kingdom,1995 (Suprami F1)	250 SC		0.020		6	3	0.49	Burke 1997 RJ2223B
						7	0.28	
Greece 1996 (Arabio	250 SC		0.020		6	3	0.20	Clarke 1997 RJ2251B
						7	0.06	
France, South 1996 (Mosaica)	250 SC		0.020		6	3	0.03	Farrelly 1997 RJ2266B
						7	0.02	
Outdoor trials								
France, North 1995 (Aramon)	250 SC		0.020		8	0	0.11	Sapiets 1996 RJ2118B
						1	0.07	
						3	0.07	
						6	0.04	
						10	0.02	
France, North 1995 (Tyhria)	250 SC		0.020		8	0	0.13	Sapiets 1996 RJ2118B
						1	0.12	
						3	0.12	
						7	0.04	
						10	0.02	
France South 1995 (Mosaica)	250 SC		0.020		7	0	0.11	Sapiets 1996 RJ2118B
						1	0.07	
						3	0.04	
						7	0.02	
						9	0.01	
Italy 1996 (Jazzer)	250 SC		0.020		6	3	0.02	Clarke 1997 RJ2345B
						7	0.01	
Spain 1996 (Bellando)	250 SC		0.020		6	3	0.06	Sapiets 1997 RJ2274B
						7	0.02	
United States Florid	800 WG	0.28			6	0	0.31, 0.26, 0.40	Bussey 1998
						1	0.40, 0.19, 0.25	

CUCUMBER Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
1997 (Dukes)	250 SC	0.28			6	0	0.38, 0.26, 0.44	RR98-045B
						1	0.38, 0.25, 0.35	
United States North Carolina 1997 (Asgrow)	800 WG	0.28			6	0	0.23, 0.30, 0.35	Bussey 1998 RR98-045B
						1	0.31, 0.29, 0.35	
	250 SC	0.28			6	0	0.47, 0.35, 0.30	
						1	0.30, 0.30, 0.35	
United States North Carolina 1996 (National Pickle)	800 WG	0.28			6	1	0.06, 0.09	Roper, *et al.* 1997 RR96-096B
United States North Carolina 1996 (Royal)	800 WG	0.28			6	1	0.06, 0.06	Roper, *et al.* 1997 RR96-096B
United States Florida, 1996 (Poinsett 76)	800 WG	0.28			6	1	0.04, 0.05	Roper, *et al.* 1997 RR96-096B
United States Illinois, 1996 (Dasher II)	800 WG	0.28			6	1	0.04, 0.04	Roper, *et al.* 1997 RR96-096B
United States Michigan, 1996 (Marketmore 76)	800 WG	0.28			6	1	0.06, 0.11	Roper, *et al.* 1997 RR96-096B
United States Texas, 1996 (Revenue)	800 WG	0.28			6	1	0.07	Roper, *et al.* 1997 RR96-096B
United States California, 1996 (Armenia)	800 WG	0.28			6	1	0.03, 0.06	Roper, *et al.* 1997 RR96-096B

Table 77 Azoxystrobin residues in gherkin from supervised trials in Germany

GHERKIN Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
Germany 1997 (Othello)	250 SC	0.25		600	4	3	0.04	Gill 1998 RJ2589B
Germany 1997 (Duet)	250 SC	0.25		600	4	3	0.05	Gill 1998 RJ2589B
Germany 1999 (Melodie)	250 SC	0.25		600	6	0 3	0.17 0.06	Gill 2000 RJ2950B
Germany 1999 (Melodie)	250 SC	0.25		600	6	0 3	0.41 0.15	Gill 2000 RJ2950B

Table 78 Azoxystrobin residues in melons from supervised trials indoors (glasshouse) in Europe and outdoors in Europe and the USA

MELONS Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
Indoor trials (glasshouse, poly-tunnel)								
Italy	250 SC		0.020	1000	7	3	0.05	Clarke

MELONS Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
1996 (Harper)						7	0.08	1997 RJ2246B
Greece 1996 (Brida)	250 SC		0.020	1150	6	3 8	0.12 0.18	Clarke 1997 RJ2247B
Spain 1996 (Cantaloup)	250 SC		0.020		6	3 7	0.15 0.16	Sapiets 1997 RJ2336B
Spain 1996 (Cantaloup)	250 SC		0.020		5	3 7	0.17 0.17	Sapiets 1997 RJ2336B
Spain 1995 (Daimiel)	250 SC		0.020	1006	8	3 7	0.03 (whole fruit) 0.01 (pulp) 0.14 (skin) 0.03 (whole fruit) 0.01 (pulp) 0.16 (skin)	Clarke and Gallardo 1996 RJ2064B
Spain 1995 (Braco)	250 SC		0.020	1123	8	3 7	0.29 (whole fruit) 0.06 (pulp) 1.7 (skin) 0.22 (whole fruit) 0.05 (pulp) 1.3 (skin)	Clarke and Gallardo 1996 RJ2136B
Netherlands 1996 (Haon)	250 SC		0.020		6	3 7	0.38, 0.42 (0.40) 0.33, 0.30 (0.32)	Clarke 1997 RJ2253B
France, North 1996 (Bufalo)	250 SC		0.020		7	0 3 7 10	0.03 0.03 0.03 0.02	Clarke 1997 RJ2305B
Outdoor trials								
Greece 1995 (Birida)	250 SC		0.020		8	3 7	0.38 (whole fruit) 0.05 (pulp) 1.8 (skin) 0.24 (whole fruit) 0.02 (pulp) 1.3 (skin)	Clarke 1996 RJ2093B
Italy 1995 (Mambo)	250 SC		0.020	800–825	8	3 6	0.04 (whole fruit) < 0.01 (pulp) 0.20 (skin) 0.03 (whole fruit) < 0.01 (pulp) 0.14 (skin)	Clarke 1996 RJ2190B
Spain 1996 (Sancho)	250 SC		0.020		6	0 3 7	0.05 0.04 0.03	Clarke 1997 RJ2238B
Italy 1996 (Templar)	250 SC		0.020	1000	6	3 7	0.06 0.03	Clarke 1997 RJ2246B
Italy 1996 (Soleado)	250 SC		0.020	800	6	3 6	0.04 0.07	Clarke 1997 RJ2246B
Spain 1996 (Braco)	250 SC		0.020		6	3 7	0.04 0.08	Farrelly 1997 RJ2269B
France, South 1996 (Diego)	250 SC		0.020		6	0 3 7 10	0.05 0.03 0.04 0.02	Clarke 1997 RJ2305B
France, North	250 SC		0.020		7	0	0.02	Clarke

MELONS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
1996 (Bufalo)						3	0.01	1997 RJ2305B
						7	0.01	
						10	0.01	
France, South 1995 (Awrel)	250 SC	0.20		800	8	0 1 3 7 10	0.10 (whole fruit) 0.02 (pulp) 0.46 (skin) 0.10 (whole fruit) 0.03 (pulp) 0.42 (skin) 0.09 (whole fruit) 0.02 (pulp) 0.44 (skin) 0.05 (whole fruit) 0.01 (pulp) 0.22 (skin) 0.04 (whole fruit) 0.01 (pulp) 0.18 (skin)	Clarke and Compagnon 1996 RJ2143B
France, South 1995 (Awrel)	250 SC	0.20		300	8	0 1 3 7 11	0.05 (whole fruit) 0.01 (pulp) 0.23 (skin) 0.07 (whole fruit) 0.02 (pulp) 0.33 (skin) 0.06 (whole fruit) 0.01 (pulp) 0.27 (skin) 0.05 (whole fruit) < 0.01 (pulp) 0.35 (skin) 0.02 (whole fruit) 0.01 (pulp) 0.09 (skin)	Clarke and Compagnon 1996 RJ2143B
United States North Carolina, 1996 (Hale's Best)	800 WG	0.28			6	1	0.16, 0.17	Roper, *et.al*. 1997 RR96-096B
United States Illinois, 1996 (Saticoy Hybrid)	800 WG	0.28			6	1	0.16, 0.12	Roper, *et.al*. 1997 RR96-096B
United States Texas, 1996 (Gold Rush)	800 WG	0.28			6	1	0.09, 0.10	Roper, *et.al*. 1997 RR96-096B
United States California, 1996 (Heart of Gold)	800 WG	0.28			6	1	0.20, 0.17	Roper, *et.al*. 1997 RR96-096B
United States California, 1996 (Top Mark)	800 WG	0.28			6	1	0.23, 0.26	Roper, *et.al*. 1997 RR96-096B
United States Arizona, 1996 Top Mark Cromset)	800 WG	0.28			6	1	0.10, 0.10	Roper, *et.al*. 1997 RR96-096B
United States Texas, 1997 (Honeybrew)	800 WG	0.28			6	0	0.15, 0.15, 0.12	Bussey 1998 RR98-045B
						1	0.14, 0.16, 0.14	
	250 SC	0.28			6	0	0.14, 0.17, 0.15	
						1	0.17, 0.12, 0.12	

Table 79 Azoxystrobin residues in summer squash from supervised trials in the USA

SUMMER SQUASH Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States New York 1996 (Zucchini Elite)	800 WG	0.28			6	1	0.09, 0.07	Roper, *et al*. 1997 RR96-096B
United States North Carolina 1996 (Crookneck)	800 WG	0.28			6	1	0.16, 0.04	Roper, *et al*. 1997 RR96-096B
United States Florida, 1996 (Crookneck)	800 WG	0.28			6	1	0.03, 0.07	Roper, *et al*. 1997 RR96-096B
United States Illinois, 1996 (Seneca Hybrid)	800 WG	0.28			6	1	0.03, 0.06	Roper, *et al*. 1997 RR96-096B
United States California, 1996 (Ambassador)	800 WG	0.28			6	1	0.11, 0.11	Roper, *et al*. 1997 RR96-096B

Table 80 Azoxystrobin residues in sweet pepper from supervised trials in Europe

PEPPER Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Outdoor trials								
Spain 1996 (Piquillo)	250 SC		0.025		6	3	0.85	Farrelly 1997 RJ2280B
						7	0.59	
Spain 1998 (Italiano)	250 SC		0.025		6	0	0.25	Gill 1999 RJ2755B
						1	0.14	
						3	0.15	
						7	0.13	
						10	0.17	
Spain 1998 (Piquillo)	250 SC		0.025		6	0	1.0	Gill 1999 RJ2755B
						1	0.74	
						3	0.51	
						7	0.61	
						10	0.55	
France, South 1998 (Lamuyo)	250 SC		0.025		6	3	0.45	Gill 1999 RJ2773B
						7	0.30	
France, South 1998 (Ludo)	250 SC		0.025		6	3	0.13	Gill 1999 RJ2773B
						6	0.18	
Italy 1997 (Lipari)	250 SC		0.025		6	3	0.04	Clarke 1998 RJ2662B
						7	0.02	
						10	0.03	
Spain 1998 (Italiano)	250 SC		0.025		6	0	0.45	Lister 1999 RJ2742B
						3	0.44	
						7	0.42	
						11	0.19	
Indoor trials								
Italy 1997 (Pathos) *Poly-tunnel*	250 SC		0.025		6	3	0.35	Clarke 1998 RJ2662B
						7	0.23	
						10	0.35	

PEPPER Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Italy 1997 (Argo) *Poly-tunnel*	250 SC		0.025		6	3 6 10	0.33 0.35 0.18	Clarke 1998 RJ2662B
Netherlands 1998 (Spirit) *Greenhouse*	250 SC		0.025		6	0 3 7 10	1.6 1.4 1.3 1.0	Lister 1999 RJ2746B
France, North 1997 (Cadette) *Greenhouse*	250 SC		0.025		6	0 1 3 7 10	0.21 0.28 0.27 0.22 0.14	Clarke 1998 RJ2562B
France, North 1997 (Vidi) *Greenhouse*	250 SC		0.025		6	0 1 3 7 9	0.59 0.77 0.62 0.27 0.25	Clarke 1998 RJ2562B
France, North 1997 (Cadette) *Greenhouse*	250 SC	0.25			6	0 1 3 7 10	0.27 0.19 0.25 0.21 0.21	Clarke 1998 RJ2562B
France, North 1997 (Vidi) *Greenhouse*	250 SC	0.25			6	0 1 3 7 9	0.79 0.64 0.58 0.30 0.16	Clarke 1998 RJ2562B

Table 81 Azoxystrobin residues in tomato from supervised trials in Europe

TOMATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Outdoor trials								
France, South 1996 (Cannery Row)	250 SC		0.025		6	0 1 3 7 10	0.19 0.11 0.08 0.07 0.06	Sapiets, *et al.* 1997 RJ2294B
Italy 1996 (Ideal)	250 SC	0.20	0.025	800	6	3 7	0.19 0.08	Sapiets 1997 RJ2375
Italy 1997 (Ideal peel)	250 SC		0.025		6	3 7 10	0.15 0.15 0.14	Clarke 1998 RJ2488B
Italy 1997 (Snob)	250 SC		0.025		6	3 7 10	0.16 0.09 0.06	Clarke 1998 RJ2488B
Spain 1996 (Figaro)	250 SC		0.025		6	3 7	0.41, 0.15 0.28, 0.26	Clarke 1997 RJ2345B
Spain 1997 (Rio Fuego)	250 SC	0.25			6	0 3 7 10	0.28 0.32 0.40 0.33	Clarke, 1998 RJ2490B

TOMATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 1997 (Rio Fuego)	250 SC	0.23			6	0 3 7 10	0.59 0.31 0.03 0.27	Clarke, 1998 RJ2490B
Greece 1996 (Galli)	250 SC		0.025		6	3 7	0.33 0.39	Clarke 1997 RJ2341B
Indoor trials								
France, South 1996 (Ondina) *Greenhouse*	250 SC		0.025		6	0 1 3 7 10	0.11 0.12 0.08 0.06 0.06	Sapiets, *et. al* 1997 RJ2294B
Italy 1997 (Galaxy) *Greenhouse*	250 SC		0.025		6	3 7 10	0.33 0.32 0.27	Clarke 1998 RJ2488B
Netherlands 1997 (Cherry Favorita) *Greenhouse*	250 SC		0.025		6	3 7	0.25, 0.22 0.26, 0.29	Clarke 1998 RJ2552B
France, North 1997 (Tradiro) *Greenhouse*	250 SC		0.025		6	3 7	0.54 0.33	Clarke 1998 RJ2489B
France, North 1997 (Paolo) *Greenhouse*	250 SC		0.025		6	3 7	0.20 0.15	Clarke 1998 RJ2489B
France, North 1997 (Sweet Cherry) *Greenhouse*	250 SC		0.025		6	3 7	0.86 0.73	Clarke 1998 RJ2489B
Spain 1997 (Gabriela) *Greenhouse*	250 SC	0.26			6	0 3 7 10	0.51, 0.39 0.69, 0.40 0.35, 0.32 0.51, 0.42	Clarke, 1998 RJ2490B
Spain, 1997 (Gabriela) *Greenhouse*	250 SC	0.24			6	0 3 7 10	0.42, 0.48 0.54, 0.36 0.41, 0.34 0.43, 0.32	Clarke, 1998 RJ2490B
France, North 1997 (Tradiro) *Greenhouse*	250 SC	0.25			6	3 7	0.20 0.19	Clarke 1998 RJ2489B
France, North 1997 (Paolo) *Greenhouse*	250 SC	0.25			6	3 7	0.14 0.08	Clarke 1998 RJ2489B
France, North 1997 (Sweet Cherry) *Greenhouse*	250 SC	0.25			6	3 7	0.49 0.43	Clarke 1998 RJ2489B

Table 82 Azoxystrobin residues in lettuce from supervised trials in Europe

LETTUCE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United Kingdom 1999 (Roxette)	250 SC	0.25	0.125	200	4	0	11	Gill 2000 RJ2925B
						3	0.69	
						7	0.10	
						14	≤ 0.01	
United Kingdom 1999 (Malibu)	250 SC	0.25	0.125	200	4	14	1.2	Gill 2000 RJ2925B
United Kingdom 1999 (Saladin Abba)	250 SC	0.25	0.125	200	4	0	3.5	Gill 2000 RJ2925B
						3	< 0.01	
						7	0.02	
						14	≤ 0.01	
United Kingdom 1999 (Siletta)	250 SC	0.25	0.125	200	4	14	1.6	Gill 2000 RJ2925B
United Kingdom 2000 (Romaine)	250 SC	0.25	0.06	400	3	0	7.6	Richards 2001 RJ3145B
						2	2.7	
						7	1.2	
						9	0.76	
						14	0.19	
						21	0.46	
	250 SC	0.25	0.06	400	2	0	5.5	
						2	2.4	
						7	0.79	
						9	0.45	
						14	0.49	
						21	0.28	
United Kingdom 2000 (Little Gem Tozeas)	250 SC	0.25	0.06	400	3	0	3.0	Richards 2001 RJ3145B
						3	0.99	
						7	0.20	
						10	0.06	
						14	≤ 0.01	
						21	< 0.01	
	250 SC	0.25	0.06	400	2	0	2.8	
						3	1.4	
						7	0.14	
						10	0.03	
						14	< 0.01	
						21	< 0.01	
United Kingdom 2000 (Iceberg Robinson)	250 SC	0.25	0.06	400	3	0	0.50	Richards 2001 RJ3145B
						3	0.08	
						7	< 0.01	
						10	< 0.01	
						13	≤ 0.01	
						21	< 0.01	
	250 SC	0.25	0.06	400	2	0	0.31	
						3	0.02	
						7	< 0.01	
						10	< 0.01	
						13	< 0.01	
						21	< 0.01	
United Kingdom 2000 (Malibu)	250 SC	0.25	0.125	200	4	0	7.7	Gill 2001 RJ3150
						3	4.8	
						7	3.6	
						14	0.39	

LETTUCE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United Kingdom 2000 (Roxette)	250 SC	0.25	0.125	200	4	14	0.25	Gill 2001 RJ3150
United Kingdom 2000 (Little Gem Attico)	250 SC	0.25	0.125	200	4	0	4.0	Gill 2001 RJ3150
						3	1.0	
						7	0.24	
						14	0.56	
United Kingdom 2000 (Siletta)	250 SC	0.25	0.125	200	4	14	< 0.01	Gill 2001 RJ3150
France (South) 1999 (Locness)	250 SC	0.25	0.08	300	3	BLA	3.5	White and Sutra 2001 RJ3106B
						0	16	
						3	3.3	
						7	0.44	
						14	0.10	
						21	0.01	
France (South) 1999 (Nadine)	250 SC	0.25	0.08	300	3	BLA	2.1	White and Sutra 2001 RJ3106B
						0	8.3	
						3	2.2	
						7	0.85	
						14	0.32	
						21	0.08	
France (South) 2000 (Ballerina)	250 SC	0.25	0.08	300	3	0	3.8	Gill 2001 RJ3182B
						3	2.2	
						6	1.1	
						10	0.80	
						16	0.14	
	250 SC	0.25	0.08	300	2	0	3.2	
						3	2.9	
						6	1.1	
						10	1.0	
						16	0.13	
	250 SC	0.25	0.08	300	1	0	3.0	
						3	3.2	
						6	0.58	
						10	0.64	
						16	0.06	
France (North) 2000 (Nadege)	250 SC	0.25	0.08	300	3	0	6.2	Gill 2001 RJ3182B
						3	2.0	
						7	0.58	
						10	0.52	
						14	0.21	
						21	0.07	
	250 SC	0.25	0.08	300	2	0	4.3	
						3	1.6	
						7	0.85	
						10	0.23	
						14	0.24	
						21	0.02	
	250 SC	0.25	0.08	300	1	0	6.2	
						3	1.1	
						7	0.44	
						10	0.32	
						14	0.13	
						21	0.08	

LETTUCE Country Year (variety)	Application Form g ai/L, g ai/kg	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
Spain 1999 (Toro)	250 SC	0.25	0.05	507	3	0	0.35	White 2001 RJ3093B
						3	0.09	
						7	0.12	
						14	0.05	
						21	0.01	
Spain 1999 (Odra)	250 SC	0.25	0.05	507	3	0	6.5	White 2001 RJ3093B
						3	1.1	
						7	1.4	
						14	0.43	
						21	0.12	
Spain 1999 (Arena)	250 SC	0.26	0.04	673	3	0	10	Ryan and Gallardo 2001 RJ3112B
						3	0.32	
						7	0.08	
						14	0.14	
						21	0.03	
Spain 2000 (Salad Franchesca)	250 SC	0.25	0.05	507	3	BLA	0.32	Fillingham and Iniesta 2001 RJ3131B
						0	2.9	
						3	0.29	
						7	0.12	
						9	0.11	
						14	0.01	
	250 SC	0.25	0.05	535	2	BLA	0.29	
						0	1.9	
						3	0.29	
						7	0.07	
						9	0.04	
						14	0.02	
Spain 2000 (Aitana)	250 SC	0.25	0.04	596	3	BLA	0.79	Fillingham and Iniesta 2001 RJ3131B
						0	1.0	
						3	1.3	
						7	0.23	
						10	0.24	
						14	0.08	
	250 SC	0.25	0.04	700	2	BLA	0.23	
						0	0.96	
						3	1.1	
						7	0.31	
						10	0.18	
						14	0.01	

Table 83 Azoxystrobin residues in succulent beans from supervised trials in the USA

BEANS Country Year (variety)	Application Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max	PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
United States North Carolina 1999 (Thorogreen)	800 WG	0.28			8	0	No pods: 0.06, 0.07	Spillner 2000 RR-00-051B
United States Illinois 1999 (Butter bean)	800 WG	0.28			8	0	No pods: 0.07, 0.08	Spillner 2000 RR-00-051B
United States California 1999 (Fordbook 242)	800 WG	0.28			7	0	No pods: 0.01, 0.02	Spillner 2000 RR-00-051B

BEANS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States North Carolina 1999 (Contender)	800 WG	0.28			7	0	With pods: 0.30, 0.48, 0.38, 0.34	Spillner 2000 RR-00-052B
United States Michigan 1999 (Bush Blue Lake 274)	800 WG	0.28			7	0	With pods: 0.10, 0.09, 0.11, 0.09	Spillner 2000 RR-00-052B
United States Mississippi 1999 (Commodore)	800 WG	0.28			7	0	With pods: 1.0, 0.78, 0.76, 1.5	Spillner 2000 RR-00-052B

Table 84 Azoxystrobin residues in succulent peas from supervised trials in the USA

PEAS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United States Illinois, 1999 (Dual)	800 WG	0.28			7	0	No pods: 0.03, 0.03	Bussey 2000 RR99-094B
United States North Carolina 1999 (Early Alaska)	800 WG	0.28			7	0	No pods: 0.05, 0.08	Bussey 2000 RR99-094B
United States North Carolina 1999 (Progress #9)	800 WG	0.28			7	0	No pods: 0.17, 0.13	Bussey 2000 RR99-094B
United States California, 1999 (OSP II)	800 WG	0.28			7	0	With pods: 1.2, 0.99, 0.71, 1.0	Bussey 2000 RR99-095B
United States North Carolina 1999 (Dwarf Gray Sugar)	800 WG	0.28			7	0	With pods: 1.1, 0.65, 1.5, 1.2	Bussey 2000 RR99-095B
United States Illinois, 1999 (Dwarf Gray Sugar)	800 WG	0.28			7	0	With pods: 0.78, 0.87, 0.60, 0.63	Bussey 2000 RR99-095B

Table 85 Azoxystrobin residues in soybeans from supervised trials in the USA

SOYBEAN SEEDS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ Max			
United States Georgia, 1998 (NKS 75-55)	800 WG	0.28			6	14	0.02, 0.05	Bussey and Lipton 1999 RR 99-049B
United States North Carolina, 1998 (Hyperformer 574)	800 WG	0.28			6	13	0.18, 0.17	Bussey and Lipton 1999 RR 99-049B

SOYBEAN SEEDS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ Max			
United States Louisiana, 1998 (Delta Pine 3588)	800 WG	0.28			6	13	0.24, 0.23	Bussey and Lipton 1999 RR 99-049B
United States Arkansas, 1998 (Asgrow 5901)	800 WG	0.28			6	12	0.13, 0.15	Bussey and Lipton 1999 RR 99-049B
United States Mississippi, 1998 (Pioneer 9492)	800 WG	0.28			6	12	0.06, 0.06	Bussey and Lipton 1999 RR 99-049B
United States Iowa, 1998 (L2102cn)	800 WG	0.28			6	15	0.23, 0.01	Bussey and Lipton 1999 RR 99-049B
United States Iowa, 1998 (NK 30-06)	800 WG	0.28			6	14	0.01, 0.02	Bussey and Lipton 1999 RR 99-049B
United States Illinois, 1998 (Asgrow A3244)	800 WG	0.28			6	16	0.05, 0.09	Bussey and Lipton 1999 RR 99-049B
United States Illinois, 1998 (S30-06)	800 WG	0.28			7	13	0.02, 0.02	Bussey and Lipton 1999 RR 99-049B
United States Illinois, 1998 (Pioneer 9281)	800 WG	0.28			7	12	0.03, 0.03	Bussey and Lipton 1999 RR 99-049B
United States Indiana, 1998 (Pioneer 9333rr)	800 WG	0.28			6	12	0.33, 0.33	Bussey and Lipton 1999 RR 99-049B
United States Indiana, 1998 (Asgrow AG3601)	800 WG	0.28			6	14	0.05, 0.06	Bussey and Lipton 1999 RR 99-049B
United States Kansas, 1998 (S30-60)	800 WG	0.28			6	10	0.02, 0.03	Bussey and Lipton 1999 RR 99-049B
United States Minnesota, 1998 (Novartis S19-90)	800 WG	0.28			7	13	0.01, 0.02	Bussey and Lipton 1999 RR 99-049B
United States Minnesota, 1998 (T50598)	800 WG	0.28			6	14	0.04, 0.07	Bussey and Lipton 1999 RR 99-049B
United States Missouri, 1998 (NK3911)	800 WG	0.28			6	14	0.02, 0.02	Bussey and Lipton 1999 RR 99-049B
United States Nebraska, 1998 (Pioneer 92b52)	800 WG	0.28			5	12	0.11, 0.12	Bussey and Lipton 1999 RR 99-049B

SOYBEAN SEEDS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ Max			
United States Ohio, 1998 (S30-06)	800 WG	0.28			7	14	0.03, 0.06	Bussey and Lipton 1999 RR 99-049B
United States South Dakota, 1998 (Novartis S19-90)	800 WG	1x0.17 6x0.28			7	14	≤ 0.01, < 0.01	Bussey and Lipton 1999 RR 99-049B
United States South Dakota, 1998 (Cropland L0704)	800 WG	0.28			6	13	0.01, 0.02	Bussey and Lipton 1999 RR 99-049B

Table 86 Azoxystrobin residues in beetroot from supervised trials in the USA

BEETROOTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max		Roots	Tops	
United States Washington, 2001 (Early Wonder Tall Top)	800 WG	0.28			6	0	0.24, 0.18	12, 11	Ediger 2002 495-01
	250 SC	0.28			6	0	0.17 0.32	13, 12	
United States New York, 2001 (Detroit Dark Red)	800 WG	0.28			6	0	0.33, 0.34	22, 22	Ediger 2002 495-01
	250 SC	0.28			6	0	0.12, 0.15	20, 22	
United States Texas, 2001 (Detroit Dark Red)	800 WG	0.28			6	0	0.20, 0.18	9.1, 10	Ediger 2002 495-01
	250 SC	0.28			6	0	0.23, 0.20	12, 8.6	
United States Illinois 2001 (Warrior)	800 WG	0.28			6	0	0.18, 0.18	6.4, 7.3	Ediger 2002 495-01
	250 SC	0.28			6	0	0.10, 0.07	15, 11	

Table 87 Azoxystrobin residues in carrot from supervised trials in the USA

CARROT Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
US Champaign, IL 1998 (Goldenhart)	80 WG	0.37			8	0	0.17, 0.16	Aston and Bussey 1999 RR-99-041B
US Alamo, TX 1998 (Danver)	80 WG	0.37			6	0	0.13, 0.08	Aston and Bussey 1999 RR-99-041B
US Visalia, CA 1998 (Coral II)	80 WG	0.37			6	0	0.26, 0.20	Aston and Bussey 1999 RR-99-041B

CARROT Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
US Holtville, CA 1998 (Chaktaw)	80 WG	0.37			6	0	0.03, 0.02	Aston and Bussey 1999 RR-99-041B
US Madera, CA 1998 (Mercury Hyb Imp 58 Type)	80 WG	0.37			6	0	0.30, 0.28	Aston and Bussey 1999 RR-99-041B
US Apopka, FL 1998 (Apache)	80 WG	0.37			6	0	0.14, 0.11	Aston and Bussey 1999 RR-99-041B

Table 88 Azoxystrobin residues in chicory from supervised trials in France

CHICORY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha[a]	kg ai/hL	Water, L/ha	No./ max		Portion	Residue	
France 1998 (Platine)	250 SC	0.25 + 0.01 kg ai/hL			2 + 1	14	Leaf	0.19	Lister 1999 RJ2815B
							Root	0.02	
						20	Chicon	0.05	
							Root	0.18	
	250 SC	0.25 + 2.5			2 + 1	20	Chicon	0.11	
							Root	0.11	
France 1998 (Flash)	250 SC	0.25 + 0.01 kg ai/hL			2 + 1	14	Leaf	0.30	Lister 1999 RJ2815B
							Root	0.04	
						20	Chicon	0.04	
							Root	0.15	
	250 SC	0.25 + 2.5			2 +1	20	Chicon	0.10	
							Root	0.06	
France 1998 (Turbo)	250 SC	0.25 + 0.01 kg ai/hL			2 + 1	14	Leaf	0.29	Lister 1999 RJ2815B
							Root	0.03	
						21	Chicon	0.03	
							Root	0.25	
	250 SC	0.25 + 2.5			2 +1	21	Chicon	0.05	
							Root	0.07	
France 1999 (Turbo)	250 SC	0.25 + 0.01 kg ai/hL			2 + 1	15	Leaf	0.12	Ryan 2000 RJ3042B
							Root	0.01	
						21	Chicon	< 0.01	
							Root	0.50	
	250 SC	0.25 + 2.5			2 +1	21	Chicon	0.03	
							Root	0.46	
France 1999 (Turbo)	250 SC	0.25 + 0.01 kg ai/hL			2 + 1	15	Leaf	0.36	Ryan 2000 RJ3042B
							Root	0.03	
						21	Chicon	< 0.01	
							Root	0.56	
	250 SC	0.25 + 2.5			2 +1	21	Chicon	0.03	
							Root	0.25	

[a]Plants were treated twice with a 250 SC azoxystrobin formulation at the rate of 0.25 kg ai/ha at intervals of 20–22 days. Fourteen days after the second application mature plants were harvested, the leaves removed, and the roots stored in a climate controlled room. After 14 days the roots were separated into two batches and each batch treated with azoxystrobin. The first set of roots were dipped in a solution containing 10 g ai/hL of azoxystrobin for two minutes and the second set were arranged upright, one layer deep, and sprayed once with azoxystrobin at a rate of 2500 g ai/ha. Following the treatments, hydroponic forcing was performed on both sets of roots in dark climate-controlled rooms. When mature chicons (the edible leaves after forcing) had developed, samples were taken and analysed for azoxystrobin.

Table 89 Azoxystrobin residues in potato resulting from soil applications in supervised trials in Europe

POTATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France (south) 2005 (Mona Lisa)	250 SC	1.5			1	60	0.02	Bour 2006 05-0309
						90	0.01	
						105	< 0.01	
						119	< 0.01	
	250 SC	0.39 In-furrow			1	60	0.03	
						90	0.01	
						105	< 0.01	
						119	< 0.01	
France (south) 2005 (Mona Lisa)	250 SC	1.6			1	55	0.03	Bour 2006 05-0309
						90	0.01	
						105	0.01	
						120	< 0.01	
	250 SC	0.37 In-furrow			1	55	0.03	
						90	0.01	
						105	0.01	
						120	0.01	
France (south) 2005 (Mona Lisa)	250 SC	1.5			1	59	0.07	Bour 2006 05-0309
						90	0.02	
						105	0.02	
						119	0.01	
	250 SC	0.39 In-furrow			1	59	0.03	
						90	0.01	
						105	< 0.01	
						119	< 0.01	
France (south) 2005 (Europa)	250 SC	1.5			1	85	0.01	Bour 2006 05-0309
						92	0.02	
						103	0.03	
						119	0.03	
	250 SC	0.38 In-furrow			1	85	0.01	
						92	0.01	
						103	0.02	
						119	0.01	
Spain 1999 (Kennebeck)	250 SC	1.5			1	109	< 0.01	Gill 2000 RJ2934B
						137	< 0.01	
Spain 1999 (Jaerla)	250 SC	1.5			1	104	< 0.01	Gill 2000 RJ2934B
						123	< 0.01	
Spain 2000 (Kennebeck)	250 SC	1.4			1	109	< 0.01	Richards 2001 RJ3130B
						121	< 0.01	
Spain 2000 (Kennebeck)	250 SC	1.4			1	97	< 0.01	Richards 2001 RJ3130B
						108	< 0.01	
Spain 2000 (Jaerla)	250 SC	1.5			1	103	< 0.01	Richards 2001 RJ3130B
						122	< 0.01	
Spain 2000 (Marfona)	250 SC	1.5			1	102	< 0.01	Richards 2001 RJ3130B
						120	< 0.01	
Italy (north) 1999 (Agata)	250 SC	1.5			1	96	0.03	Gill 2000 RJ2935B
						126	0.01	
Italy (north) 1999 (Vivaldi)	250 SC	1.5			1	105	0.02	Gill 2000 RJ2935B
						141	0.01	

POTATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Netherlands 1998 (Bildstar)	250 SC	1.5			1	108	0.01	Gill 1999 RJ2795B
						118	0.01	
	250 SC	0.79 In-furrow			1	108	0.01	
						118	0.02	
Netherlands 1998 (Bintje)	250 SC	1.5			1	95	0.01	Gill 1999 RJ2795B
						116	0.01	
	250 SC	0.78 In-furrow			1	95	0.01	
						116	0.03	
Netherlands 1999 (Bildstar)	250 SC	1.5			1	98	< 0.01	Gill 2000 RJ2968B
						125	< 0.01	
	250 SC	0.77 In-furrow			1	98	< 0.01	
						125	< 0.01	
Netherlands 1999 (Bintje)	250 SC	1.6			1	77	≤ 0.01	Gill 2000 RJ2968B
						124	< 0.01	
	250 SC	0.79 In-furrow			1	77	< 0.01	
						124	< 0.01	
Netherlands 2000 (Bildstar)	250 SC	1.5			1	73	0.01	Fillingham 2001 RJ3120B
						111	< 0.01	
	250 SC	0.8 In-furrow			1	73	0.03	
						111	0.01	
Netherlands 2000 (Bildstar)	250 SC	1.5			1	95	0.01	Fillingham 2001 RJ3120B
						138	0.01	
	250 SC	0.73 In-furrow			1	95	< 0.01	
						138	< 0.01	
United Kingdom 1999 (Estima)	250 SC	1.5			1	88	< 0.01	Gill 2000 RJ2939B
						159	< 0.01	
United Kingdom 2000 (Estima)	250 SC	1.5			1	90	< 0.01	Gill 2001 RJ3156B
						130	< 0.01	

Table 90 Azoxystrobin residues in potato resulting from foliar applications in supervised trials in Europe

POTATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 2001 (Spunta)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1742
						1	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	< 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	< 0.01	
						14	< 0.01	

POTATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
Spain 2001 (Agria)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1742
						1	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
Spain 2001 (Jaerla)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1742
						1	< 0.01	
						3	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						3	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
Spain 2001 (Agria)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1742
						1	< 0.01	
						3	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						3	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
Netherlands 2001 (Bintje)	250 SC	0.063			3	0	< 0.01	Kang 2002 CEMR-1743
						1	< 0.01	
						2	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	< 0.01	
						14	< 0.01	
	250 SC	0.125			3	0	< 0.01	
						1	< 0.01	
						2	< 0.01	
						3	< 0.01	
						5	< 0.01	
						7	≤ 0.01	
						14	< 0.01	
Netherlands 2001 (Lady Clair)	250 SC	0.063			3	0	< 0.01	Kang 2002 CEMR-1743
						1	< 0.01	
						2	< 0.01	
						3	< 0.01	
						4	< 0.01	
						7	< 0.01	
						14	< 0.01	
	250 SC	0.125			3	0	< 0.01	
						1	< 0.01	
						3	< 0.01	
						7	≤ 0.01	
						14	< 0.01	

POTATO Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
United Kingdom 2001 (Pentland Squire)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1744
						1	< 0.01	
						4	< 0.01	
						7	< 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						4	< 0.01	
						7	< 0.01	
						14	< 0.01	
United Kingdom 2001 (Marfona)	250 SC	0.125			3	0	< 0.01	Nagra 2002 CEMR-1744
						1	< 0.01	
						4	< 0.01	
						7	< 0.01	
						14	< 0.01	
	250 SC	0.25			3	0	< 0.01	
						1	< 0.01	
						4	< 0.01	
						7	< 0.01	
						14	< 0.01	

Table 91 Azoxystrobin residues in radish from supervised trials in the USA

RADISH Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max		Roots	Tops	
United States New York, 1998 (Champion)	800 WG	0.37			6	0	0.45, 0.37	23, 24	Bussey 1999 RR99-022B
United States Florida, 1998 (Comet)	800 WG	0.37			6	0	0.22, 0.29	23, 37	Bussey 1999 RR99-022B
United States Florida, 1998 (Red Baron)	800 WG	0.37			6	0	0.12, 0.16	13, 13	Bussey 1999 RR99-022B
United States Illinois, 1998 (Cherry Bomb)	800 WG	0.37			6	0	0.36, 0.38	10, 9.7	Bussey 1999 RR99-022B
United States California, 1998 (White Icicle)	800 WG	0.37			6	0	0.13, 0.09	15, 13	Bussey 1999 RR99-022B

Table 92 Azoxystrobin residues in sugar beet from supervised trials in the USA

SUGARBEET Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Michigan, 1998 (E-4 Monitor Sugar 6	800 WG	0.37			6	0	< 0.01, 0.05	Bussey 1999 RR99-036B
United States Minnesota, 1998 (Crystal 222)	800 WG	0.37			6	0	0.06, 0.04	Bussey 1999 RR99-036B

SUGARBEET Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Minnesota, 1998 (Monohikari)	800 WG	0.37			6	0	0.08, 0.24	Bussey 1999 RR99-036B
United States Minnesota, 1998 (Beta seed Kw 1880)	800 WG	0.37			6	0	0.06, 0.09	Bussey 1999 RR99-036B
United States Montana, 1998 (Ach 192)	800 WG	0.37			6	0	0.04, 0.03	Bussey 1999 RR99-036B
United States North Dakota 1998 (Monohikari)	800 WG	0.37			6	0	0.08, 0.11	Bussey 1999 RR99-036B
United States Colorado, 1998 (Seedex XI)	800 WG	0.37			6	0	0.09, 0.09	Bussey 1999 RR99-036B
United States California, 1998 (Ss-7B1r)	800 WG	0.37			6	0	0.10, 0.06	Bussey 1999 RR99-036B
United States Idaho, 1998 (P-M9 Hilleshog)	800 WG	0.37			6	0	0.06, 0.03	Bussey 1999 RR99-036B

Table 93 Azoxystrobin residues in artichokes from supervised trials in France, Spain, the USA

ARTICHOKE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France 1998 (Macau)	250 SC	0.25		500	4	0[a]	0.25	Lister 1999 RJ2738
						0	0.71	
						3	0.43	
						7	0.22	
						10	0.24	
						14	0.07	
France 1998 (Chrysantheme)	250 SC	0.25		500	4	0[a]	0.33	Lister 1999 RJ2738
						0	0.87	
						3	0.63	
						7	0.30	
						10	0.28	
						14	0.06	
France 1999 (Camus)	250 SC	0.25		500	4	7	0.16	Lister 2000 RJ2922B
France 2000 (Camus)	250 SC	0.25		510	4	0	1.6	Lister 2001 RJ3122B
						3	0.89	
						7	0.42	
						10	0.33	
						14	0.39	
	250 SC	0.25		500	2	0	1.6	
						3	0.53	
						7	0.25	
						10	0.27	
						14	0.16	

ARTICHOKE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water, L/ha	No./ max			
France 2000 (Castel)	250 SC	0.25		510	4	0	0.66	Lister 2001 RJ3122B
						3	0.47	
						7	0.27	
						10	0.23	
						14	0.06	
	250 SC	0.25		510	2	0	1.0	
						3	0.65	
						7	0.48	
						10	0.29	
						14	0.08	
Spain 1999 (Blanca de Tudela)	250 SC	0.25		990	4	7	0.61	Lister 2000 RJ2865
	250 SC	0.25		800	2	7	0.21	
United States California 1999 (Green Globe)	800 WG	0.28		697	6	0	1.5, 1.6	Van Starner 2002 07364
United States California 1999 (Green Globe)	800 WG	0.28		703	6	0	1.8, 1.6	Van Starner 2002 07364
United States California 1999 (Green Globe)	800 WG	0.28		704	6	0	2.4, 2.1	Van Starner 2002 07364

Table 94 Azoxystrobin residues in asparagus from supervised trials in France and the USA

ASPARAGUS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
France 1998 (Cito)	250 SC	0.25		500	4	243	≤ 0.01	Gill 1999 RJ2895B
France 1998 (Larac)	250 SC	0.25		200	4	215	≤ 0.01	Gill 1999 RJ2895B
France 1998 (Stelinc)	250 SC	0.25		300	4	259	≤ 0.01	Gill 1999 RJ2895B
France 1998 (Argenteuil)	250 SC	0.25		400	4	226	≤ 0.01	Gill 1999 RJ2895B
United States California, 1999 (UC 157-F1)	800 WG	0.28		470	6	93	≤ 0.02, < 0.02	Thompson 2001 07033
United States California, 1999 (UC 157-F1)	800 WG	0.28		466	6	104	≤ 0.02, < 0.02	Thompson 2001 07033

Table 95 Azoxystrobin residues in trimmed and untrimmed celery from supervised trials in Italy and the UK

CELERY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Trim	Untrim	
Italy 2000 (Celery D'Elne)	250 SC	0.25		800	4	6	0.19	1.4	McGill 2001 RJ3213B
						14	0.10	0.57	
Italy 2000 (Celery D'Elne)	250 SC	0.25		800	4	6	0.16	1.0	McGill 2001 RJ3213B
						14	0.09	1.0	
Italy 2000 (Utah)	250 SC	0.25		800	4	6	0.33	2.0	McGill 2001 RJ3213B
						15	0.38	1.4	
Italy 2000 (Utah)	250 SC	0.25		800	4	6	0.73	2.5	McGill 2001 RJ3213B
						15	0.42	1.4	
Italy 2001 (Florida)	250 SC	0.25		787	4	0[a]	0.18	0.30	Kang 2002 CEMR-1732
						0	0.66	1.6	
						3	0.47	0.95	
						7	0.38	1.0	
						10	0.41	1.8	
						14	0.23	1.3	
Italy 2001 (Florida)	250 SC	0.25		822	4	0[a]	0.11	0.69	Kang 2002 CEMR-1732
						0	0.34	5.2	
						3	0.25	0.42	
						7	0.04	0.11	
						10	0.12	0.19	
						14	0.07	0.09	
United Kingdom 1998 (Celebrity)	250 SC	0.25		500	4	0	0.56		Sapiets 1999 RJ2776B
						3	0.81		
						7	0.36		
						14	0.23	2.9	
United Kingdom 1998 (Claudius)	250 SC	0.25		500	4	0	0.67		Sapiets 1999 RJ2776B
						3	0.53		
						7	0.36		
						14	0.33	3.2	
United Kingdom 1998 (Claudius)	250 SC	0.25		500	4	14	0.05	0.43	Sapiets 1999 RJ2776B
United Kingdom 1998 (Claudius)	250 SC	0.25		500	4	14	0.10		Sapiets 1999 RJ2776B
United Kingdom 1998 (Rijk Zwaan)	250 SC	0.25		500	5	0	0.26		Sapiets 1999 RJ2777B
						3	0.28		
						7	0.71		
						14	0.08	0.28	
United Kingdom 1998 (Tango)	250 SC	0.25		500	7	14	0.11	0.23	Sapiets 1999 RJ2777B
United Kingdom 1999 (Tango)	250 SC	0.25		500	5	0	0.52		Gill 2000 RJ2947B
						3	0.81		
						7	0.18		
						14	0.09	0.25	
United Kingdom 1999 (Tango)	250 SC	0.25		500	4	14	0.26	0.96	Gill 2000 RJ2947B

Table 96 Azoxystrobin residues in barley grains from supervised trials in Europe

BARLEY GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
France (south) 2003 (Nevada)	250 SC	0.25			2	37	0.04	Sole 2004 03-0303
France (south) 2003 (Reine)	250 SC	0.25			2	36	0.01	Sole 2004 03-0304
						46	0.01	
France 2004 (Nevada)	250 SC	0.25			2	35	0.10	Benazeraf 2005 04-0304
						43	0.13	
France 2004 (Vanessa)	250 SC	0.26			2	35	0.13	Benazeraf 2005 04-0304
						43	0.06	
France (south) 2001 (Sonja)	250 SC	0.20		400	2	42	0.01	Pointurier 2002 0112701
France (south) 2001 (Baraka)	200 SC	0.20		400	2	42	0.11	Pointurier 2002 0112702
France (south) 2001 (Baraka)	200 SC	0.20		400	2	40	0.03	Pointurier 2002 0112703
France (south) 2001 (Platine)	200 SC	0.20		400	2	40	0.03	Pointurier 2002 0112704
France (south) 2001 (Sonja)	200 SC	0.20			3	42	0.01	Pointurier 2002 0113201
France (south) 2001 (Sonja)	200 SC	0.20			3	42	0.02	Pointurier 2002 0113201
France (south) 2001 (Baraka)	200 SC	0.20		400	2	42	0.19	Pointurier 2002 0113202
France (south) 2001 (Baraka)	200 SC	0.20		400	2	43	0.02	Pointurier 2002 0113203
France (south) 2001 (Platine)	200 SC	0.20		400	2	41	0.02	Pointurier 2002 0113204
France (south) 1993 (Pastoral)	250 SC	0.18		300	3	35	0.13	Sapiets 1994 RJ1766B
	400 WG	0.25		300	3	35	0.12	
France (south) 1993 (Volga)	250 SC	0.17		300	3	26	0.04	Sapiets 1994 RJ1766B
	400 WG	0.25		300	3	26	0.06	
France 1993 (Plaisant)	250 SC	0.16			3	37	0.01	Sapiets, *et al.* 1995 RJ1775B
	400 WG	0.25			3	37	0.05	
France 1993 (Plaisant)	250 SC	0.16			3	47	0.01	Sapiets, *et al.* 1995 RJ1775B
	400 WG	0.25			3	47	0.09	

BARLEY GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
France 1993 (Express)	250 SC	0.16			3	37	0.02	Renard and Sapiets 1994 RJ1744B
	250 SC	0.25			3	37	0.11	
France 1994 (Baraka)	250 SC	0.25			3	35	0.09	Sapiets 1995 RJ1918B
France 1994 (Labea)	250 SC	0.25			3	35	0.04	Sapiets 1995 RJ1918B
France 1994 (Intro)	250 SC	0.25			3	35	0.08	Sapiets 1995 RJ1918B
Germany 1994 (Teo)	250 SC	0.25			3	35	0.10	Tillkes 1995 ZEN-9403
Germany 1993 (Hanna)	250 SC	0.17			3	59	< 0.01	Sapiets 1994 RJ1756B
	250 SC	0.26			3	59	0.02	
Germany 1993 (Sissy)	250 SC	0.17			3	44	< 0.01	Burke and Sapiets 1994 RJ1762B
	250 SC	0.26			3	44	0.02	
Germany 1994 (Teo)	250 SC	0.25			3	35	0.11	Sapiets 1995 RJ1870B
Germany 1995 (Hanna)	200 SC	0.20		300	3	22	0.48	Burke 1996 RJ2070B
						33	0.12	
Germany 2001 (Carreo)	200 SC	0.20		300	2	37	0.02	Simon 2002 Gba32301
						49	0.01	
Germany 2001 (Theresa)	200 SC	0.20		300	2	34	0.12	Simon 2002 Gba92301
Italy 2003 (Federal)	250 SC	0.26			2	36	0.08	Sole, 2004 03-0301
Italy 2003 (Nikel)	250 SC	0.25			2	36	0.10	Sole, 2004 03-0302
Netherlands 2003 (Barke)	250 SC	0.25			2	37	0.08	Benazeraf 2004 03-0407
Spain 2003 (Astoria)	250 SC	0.25			2	35	0.03	Sole 2004 03-0305
Spain 2004 (Germania)	250 SC	0.26			2	38	0.28	Benazeraf 2005 04-0305
Spain 2004 (Sultane)	250 SC	0.25			2	35	0.11	Benazeraf 2005 04-0305
						49	0.04	
Sweden 1994 (Golf)	250 SC	0.25		200	2	42	0.20	Sapiets 1995 RJ1900B

BARLEY GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Switzerland 2003 (Henna)	250 SC	0.26		309	2	36	0.01	Benazeraf 2004 03-0408
						49	0.02	
Switzerland 2003 (Landi)	250 SC	0.26		311	2	36	0.04	Benazeraf 2004 03-0418
						47	0.02	
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.01	Pointurier 2002 2071/01
						43	0.01	
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.03	Pointurier 2002 2072/01
						43	0.02	
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.02	Pointurier 2002 2073/01
						43	0.02	
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.02	Pointurier 2002 2074/01
						43	0.02	
United Kingdom 2004 (Carat)	250 SC	0.25			2 GS 51–61[a]	35	0.43 (ears)	Benazeraf 2005 04-0403
						63	0.03	
United Kingdom 2004 (Pearl)	250 SC	0.25			2 GS 55–59[a]	34	0.02 (ears)	Benazeraf 2005 04-0403
						67	< 0.01	
United Kingdom 2003 (Halcyon)	250 SC	0.25			2 GS 55–59[a]	35	0.04	Benazeraf 2004 03-0406
						60	0.01	
United Kingdom 1993 (Bronze)	250 SC	0.16			3 GS 70–71[a]	54	0.07	Hall et al. 1994 RJ1722B
	250 SC	0.25			3 GS 70–71[a]	54	0.13	
United Kingdom 1994 (Pastoral)	250 SC	0.25			3 GS 69–71[a]	38	0.23	Sapiets 1995 RJ1899B
United Kingdom 1994 (Pipkin)	250 SC	0.25			3 GS 69–71[a]	53	0.14	Sapiets 1995 RJ1899B
United Kingdom 1994 (Fighter C2 Hancock seed)	250 SC	0.25			3 GS 65–69[a]	55	0.07	Sapiets 1995 RJ1899B

[a] Growth stage at the last application.

Table 97 Azoxystrobin residues in oat grains from supervised trials in Germany

OAT GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Germany 1995 (Lutz)	200 SC	0.20		300	3	33	0.13	Burke 1996 RJ2070B
Germany 1994 (Salomon)	250 SC	0.25			3	35	0.01	Sapiets 1995 RJ1870B
Germany 1994 (Salomon)	250 SC	0.25			3	36	0.06	Tillkes 1995 ZEN-9403

Table 98 Azoxystrobin residues in rye grains from supervised trials in Germany

RYE GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Germany 1994	250 SC	0.25			3	35 42	0.04 0.03	Tillkes 1995 ZEN-9403
Germany 1995 (Rapid)	200 SC	0.20		300	3	35 44	0.02 0.01	Burke 1996 RJ2070B

Table 99 Azoxystrobin residues in triticale grains from supervised trials in Germany

TRITICALE GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Germany 1994 (Modus)	250 SC	0.25			3 3	36 44	0.02 0.01	Sapiets 1995 RJ1870B
Germany 1994	250 SC	0.25			3	36 44	≤ 0.01 < 0.01	Tillkes 1995 ZEN-9403

Table 100 Azoxystrobin residues in wheat grains from supervised trials in Europe

WHEAT GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
France (south) 2003 (Rapport)	250 SC	0.26		261	2	35	≤ 0.01	Benazeraf 2004 03-0308
France (south) 2003 (Sezanne)	250 SC	0.25		249	2	34 40	0.04 0.01	Benazeraf 2004 03-0309
France (north) 2003 (Apache)	250 SC	0.25		300	2	35 48	≤ 0.01 < 0.01	Sole 2004 03-0403
France (south) 2004 (Galibie)	250 SC	0.25		201	2	38 47	0.14 0.03	Benazeraf 2005 04-0302
France (south) 2004 (Soissons)	250 SC	0.26		207	2	35	0.03	Benazeraf 2005 04-0302
France 1993 (Soissons)	250 SC	0.17			3	70	< 0.01	Renard and Sapiets 1994 RJ1744B
	250 SC	0.25			3	70	< 0.01	
France (south) 1993 (Soissons)	250 SC	0.17		300	3	39	< 0.01	Atger *et al*. 1994 RJ1766B
	400 WG	0.25		300	3	39	≤ 0.01	
France (south) 1993 (Florence-Aurore)	250 SC	0.17		300	3	31	0.04	Atger *et al*. 1994 RJ1766B
	400 WG	0.25		300	3	31	0.08	

WHEAT GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
France 1993 (Manital)	250 SC	0.17			3	28	0.11	Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	28	0.34	
France 1993 (Gala)	250 SC	0.17			3	35	< 0.01	Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	35	0.03	
France 1994 (Manital)	250 SC	0.25			3	35	0.03	Sapiets *et al.* 1994 RJ1918B
France 1994 (Courtot)	250 SC	0.25			3	40	0.02	Sapiets *et al.* 1994 RJ1918B
France 1994 (Soisson)	250 SC	0.25			3	40	< 0.01	Sapiets *et al.* 1994 RJ1918B
France (south) 2001 (Apache)	200 SC	0.20		400	2	42	0.01	Pointurier 2002 0112901
France (south) 2001 (Apache)	200 SC	0.20		300	2	42	< 0.01	Pointurier 2002 0112902
France (south) 2001 (Eureka)	200 SC	0.20		400	2	42	0.01	Pointurier 2002 0113301
France (south) 2001 (Grazia)	200 SC	0.20		400	2	41	0.01	Pointurier 2002 0113302
Germany 1993 (Orestis)	250 SC	0.17			3	63	< 0.01	Burke and Sapiets 1994 RJ1756B
	250 SC	0.25			3	63	< 0.01	
Germany 1993 (Nandu)	250 SC	0.17			3	53	< 0.01	Burke and Sapiets, 1994 RJ1762B
	250 SC	0.25			3	53	0.02	
Germany 1994 (Mieka)	250 SC	0.25			3	33	0.28	Sapiets 1995 RJ1870B
Germany 1994 (Kraka)	250 SC	0.25			3	35	0.04	Tillkes 1995 ZEN-9403
Germany 2001 (Aristos)	200 SC	0.20		300	2	35	< 0.01	Simon 2002 gwh32401
						50	< 0.01	
Germany 1995 (Monopol)	200 SC	0.20		300	3	36	0.01	Burke 1996 RJ2070B
Germany 2001 (Kornett)	200 SC	0.20		300	2	42	0.02	Simon 2002 gwh92401
Italy 2003 (Violet)	250 SC	0.25		252	2	35	< 0.01	Benazeraf 2004 03-0306
Italy 2003 (Soisson)	250 SC	0.26		257	2	35	0.02	Benazeraf 2004 03-0307
Spain 2003 (Cartaya)	250 SC	0.25		251	2	35	< 0.01	Benazeraf 2004 03-0310
						43	< 0.01	

WHEAT GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Spain 2004 (Kilopondio)	250 SC	0.25		205	2	35	0.04	Benazeraf 2005 04-0303
						41	0.02	
Spain 2004 (Lanza)	250 SC	0.25		200	2	35	0.01	Benazeraf 2005 04-0303
Switzerland 2003 (Levis)	250 SC	0.27		247	2	35	≤ 0.01	Sole 2004 03-0404
Switzerland 2003 (Arina)	250 SC	0.26		307	2	28	0.01	Sole 2004 03-0414
Switzerland 2001 (Albis)	200 SC	0.20		400	2	35	≤ 0.01	Pointurier 2002 2075/01
						47	< 0.01	
Switzerland 2001 (Galaxy)	200 SC	0.20		400	2	35	≤ 0.01	Pointurier 2002 2076/01
						47	< 0.01	
Switzerland 2001 (Albis)	200 SC	0.20		400	2	35	≤ 0.01	Pointurier 2002 2077/01
						47	< 0.01	
Switzerland 2001 (Galaxy)	200 SC	0.20		400	2	35	≤ 0.01	Pointurier 2002 2078/01
						47	< 0.01	
United Kingdom 2003 (Tanker)	250 SC	0.25		200	2 GS 67–69[a]	35	0.04 (ears)	Sole 2004 03-0401
						53	< 0.01	
United Kingdom 2003 (Hereward)	250 SC	0.25		200	2 GS 69[a]	35	0.23 (ears)	Sole 2004 03-0402
						58	0.02	
United Kingdom 2004 (Deben)	250 SC	0.25		202	2 GS 69[a]	35	0.04	Benazeraf 2005 04-0308
						61	< 0.01	
United Kingdom 2004 (Hereward)	250 SC	0.25		198	2 GS 69[a]	35	0.07	Benazeraf 2005 04-0308
						50	< 0.01	
United Kingdom 1993 (Spark)	250 SC	0.17			3 GS 70–71[a]	59	0.01	Hall *et al.* 1994 RJ1722B
	250 SC	0.25			3 GS 69–71[a]	59	0.03	
United Kingdom 1994 (Soisson)	250 SC	0.25			3 GS 71[a]	40	0.01	Sapiets 1995 RJ1899
United Kingdom 1994 (Apollo)	250 SC	0.25			3 GS 65–71[a]	48	0.02	Sapiets 1995 RJ1899
United Kingdom 1994 (Beaver)	250 SC	0.25			3 GS 69[a]	39	0.03	Sapiets 1995 RJ1899

[a] Growth stage at the last application.

Table 101 Azoxystrobin residues in maize grains from supervised trials in the USA

MAIZE GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States New York, 1998 (Agway 257)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States North Carolina 1998 (Pioneer 3167)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Florida, 1998 (Pioneer 3140)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (N 46-40 BY)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (NK 7070 BT)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	6	0.01, 0.01	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Indiana, 1998 (Pioneer 33A14 Hybrid)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Indiana, 1998 (Pioneer 34G81 Hybrid)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Minnesota, 1998 (Pioneer 3568)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Minnesota, 1998 (N 2555 Bt))	800 WG	0.28			8	7	0.01, 0.01	Bussey, 1999 RR 99-050B
United States Missouri, 1998 (Pioneer 3568)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Nebraska, 1998 (Pioneer 3406)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Nebraska, 1998 (Pioneer 34R06)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (DK 566)	800 WG	0.28			8	7	0.02, 0.01	Bussey, 1999 RR 99-050B
United States Ohio, 1998 (Pioneer 3394)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Wisconsin, 1998 (NK 4242)	800 WG	0.28			8	6	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B
United States Texas, 1998 (Mycogen 2868)	800 WG	0.28			8	7	≤ 0.01, < 0.01	Bussey, 1999 RR 99-050B

MAIZE GRAIN Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Washington, 1998 (Hybritech Hybrid)	800 WG	0.28			8	7	<u>≤ 0.01</u>, < 0.01	Bussey, 1999 RR 99-050B

Table 102 Azoxystrobin residues in rice grains from supervised trials in the USA

RICE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	Season Max kg ai/ha			
United States Arkansas, 1995 (Kay Bonnet)	800 WG	0.22(2×)+0.34			0.78	27	<u>1.6</u>, 1.6	Sapiets 1996 RJ2201B
United States Arkansas, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	27	<u>0.81</u>, 0.72	Sapiets 1996 RJ2201B
United States Arkansas, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	28	0.38, <u>0.43</u>	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	<u>0.07</u>, 0.07	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	27	<u>0.41</u>, 0.38	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	28	<u>0.29</u>, 0.25	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	28	<u>0.89</u>, 0.74	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	0.28, <u>0.30</u>	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	27	0.65, <u>0.74</u>	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	<u>2.8</u>, 2.5	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	28	<u>0.30</u>, 0.30	Sapiets 1996 RJ2201B
United States Missouri, 1995 (Allen)	800 WG	0.22(2×)+0.34			0.78	28	<u>0.19</u>, 0.18	Sapiets 1996 RJ2201B
United States Texas, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	26	3.2, <u>3.3</u>	Sapiets 1996 RJ2201B
United States Texas, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	26	0.41, <u>0.62</u>	Sapiets 1996 RJ2201B
United States California, 1995 (M-103)	800 WG	0.22(2×)+0.34			0.78	28	2.4, <u>3.0</u>	Sapiets 1996 RJ2201B

RICE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	Season Max kg ai/ha			
United States California, 1995 (M-202)	800 WG	0.22(2×)+0.34			0.78	28	2.1, 2.3	Sapiets 1996 RJ2201B

Table 103 Azoxystrobin residues in almond nutmeat and hulls from supervised trials in the USA

ALMONDS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Nutmeat	Hulls	
United States California 1996 (Non Pareil)	800 WG	0.28	0.01	2151	6	29	≤ 0.01	1.7	Roper 1997 RR 97-001B
						44	< 0.01	3.0	
	800 WG	0.28	0.05	533	6	29	< 0.01	2.3	
						44	< 0.01	2.4	
United States California 1996 (Butte Padre)	800 WG	0.28	0.01	2104	6	29	≤ 0.01	0.93	Roper 1997 RR 97-001B
						44	< 0.01	2.1	
	800 WG	0.28	0.05	561	6	29	< 0.01	0.67	
						44	< 0.01	0.84	
United States California 1996 (Peerless)	800 WG	0.28	0.01	2058	6	29	≤ 0.01	0.35	Roper 1997 RR 97-001B
						43	< 0.01	0.69	
	800 WG	0.28	0.05	561	6	29	< 0.01	0.25	
						43	< 0.01	0.50	
United States California, 1996 (Non Pareil)	800 WG	0.28	0.01	2151	6	29	< 0.01	0.46	Roper 1997 RR 97-001B
						44	< 0.01	1.9	
	800 WG	0.28	0.05	533	6	29	< 0.01	0.55	
						44	0.01	1.5	
United States California 1996 (Non Pareil)	800 WG	0.28	0.01	1870	6	28	< 0.01	0.93	Roper 1997 RR 97-001B
						43	< 0.01	1.3	
	800 WG	0.28	0.15	187	6	28	≤ 0.01	0.99	
						43	< 0.01	1.5	

Table 104 Azoxystrobin residues in pecans from supervised trials in the USA

PECANS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Mississippi, 1995 (Assorted)	800 WG	0.22	0.03	670	6	20	0.01	Sapiets 1996 RJ2115B
						25	0.01	
	800 WG	0.22	0.01	2340	6	23	0.02	
United States Louisiana, 1994 (Cape Fear)	800 WG	0.22	0.03	670	6	42	≤ 0.01	Sapiets 1995 RJ1950B
United States Georgia, 1994 (Desirable)	800 WG	0.22	0.01	1506	6	24	≤ 0.01	Sapiets 1995 RJ1950B
United States Mississippi, 1994 (Forker)	800 WG	0.22	0.04	561	6	37	≤ 0.01	Sapiets 1995 RJ1950B
United States Texas, 1994 (Choctaw)	800 WG	0.22	0.05	430	6	42	≤ 0.01	Sapiets 1995 RJ1950B

Table 105 Azoxystrobin residues in pistachios from supervised trials in the USA

PISTACHIOS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States California, 1999 (Kerman)	800 WG	0.28	0.03	840	6	7	0.33, 0.48	Starner IR-4 06830
United States California, 1999 (Kerman)	800 WG	0.28	0.03	840	6	7	0.26, 0.44	Starner IR-4 06830
United States California, 1999 (Kerman)	800 WG	0.28	0.03	840	6	7	0.23, 0.25	Starner IR-4 06830

Table 106 Azoxystrobin residues in cottonseed from supervised trials in the USA

COTTONSEED Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/km row	Water L/ha	No./ max			
United States North Carolina 1997 (Delta Pine 20)	800 WG		0.019		1	168	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Arkansas, 1997 (Suregrow 501)	800 WG		0.019		1	155	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Tennessee, 1997 (PM 1220 BGRR)	800 WG		0.019		1	148	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Texas, 1997 (DPL-50)	800 WG		0.019		1	121	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States New Mexico, 1997 (HS200-Paymaster)	800 WG		0.019		1	168	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Oklahoma, 1997 (Paymaster PM 183)	800 WG		0.019		1	159	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Texas, 1997 (Paymaster HS 200)	800 WG		0.019		1	176	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Texas, 1997 (Paymaster 183)	800 WG		0.019		1	124	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States California, 1997 (Maxxa)	800 WG		0.019		1	186	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Arizona, 1997 (DP5461)	800 WG		0.019		1	163	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States Mississippi, 1997 (Suregrow 125)	800 WG		0.019		1	173	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States California, 1997 (Acala Maxxa)	800 WG		0.019		1	174	≤ 0.01, < 0.01	Bussey 1998 RR 98-055B
United States South Carolina 2005 (Delta Pine 555)	250 SC	0.17			1 + 3[a]	45	0.01, 0.01	Ediger 2007 T020405-04

COTTONSEED Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/km row	Water L/ha	No./ max			
United States Mississippi, 2005 (DP444 BG/RR	250 SC	0.17			1 + 3[a]	38	0.04, 0.03	Ediger 2007 T020405-04
						45	0.02, 0.03	
						52	0.02, 0.02	
United States Arkansas, 2005 (DP 555 BR)	250 SC	0.17			1 + 3[a]	45	0.01, 0.01	Ediger 2007 T020405-04
United States Louisiana, 2005 (DP 555 BG/RR)	250 SC	0.17			1 + 3[a]	45	≤ 0.01, < 0.01	Ediger 2007 T020405-04
United States Texas, 2005 (DP 555 RR/BG)	250 SC	0.17			1 + 3[a]	45	≤ 0.01, < 0.01	Ediger 2007 T020405-04
United States Texas, 2005 (DPL 458BRR)	250 SC	0.17			1 + 3[a]	38	< 0.01, < 0.01	Ediger 2007 T020405-04
						45	≤ 0.01, < 0.01	
						52	< 0.01, < 0.01	
United States Texas, 2005 (Paymaster 2326 RR)	250 SC	0.17			1 + 3[a]	45	0.03, 0.03	Ediger 2007 T020405-04
United States Oklahoma, 2005 (ST3539BR)	250 SC	0.17			1 + 3[a]	45	≤ 0.01, < 0.01	Ediger 2007 T020405-04
United States New Mexico, 2005 (Paymaster 2326 RR)	250 SC	0.17			1 + 3[a]	45	0.01, 0.02	Ediger 2007 T020405-04
United States California, 2005 (Acala Sierra RR)	250 SC	0.17			1 + 3[a]	45	0.37, 0.54	Ediger 2007 T020405-04
United States California, 2005 (Acala Maxxa)	250 SC	0.17			1 + 3[a]	45	< 0.01, 0.03	Ediger 2007 T020405-04
United States California, 2005 (Acala Maxxa)	250 SC	0.17			1 + 3[a]	45	≤ 0.01, < 0.01	Ediger 2007 T020405-04

[a] One pre-planting in-furrow treatment at 0.17 kg ai/ha and three foliar treatments at 0.17 kg ai/ha.

Table 107 Azoxystrobin residues in peanuts from supervised trials in the USA

PEANUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Nutmeat	Hay	
United States Alabama, 1997 (GK-7)	800 WG	0.45			2	14	≤ 0.01, < 0.01	3.1, 2.4	Bussey, 1999 RR 98-046B
United States Alabama, 1997 (Andrews)	800 WG	0.52			2	14	≤ 0.01, < 0.01	3.0, 2.4	Bussey, 1999 RR 98-046B
United States Georgia, 1997 (GK-7)	800 WG	0.45			2	13	≤ 0.01, < 0.01	13, 8.1	Bussey, 1999 RR 98-046B

PEANUTS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Nutmeat	Hay	
United States Georgia, 1997 (GA Runner)	800 WG	0.45			2	14	0.01, 0.01	2.7, 3.3	Bussey, 1999 RR 98-046B
United States North Carolina, 1997 (VAC 92R)	800 WG	0.45			2	14	0.01, < 0.01	6.7, 8.3	Bussey, 1999 RR 98-046B
United States North Carolina, 1997 (NC-7)	800 WG	0.45			2	14	0.13, 0.11	8.6, 9.3	Bussey, 1999 RR 98-046B
United States South Carolina, 1997 (Birdsong 108)	800 WG	0.45			2	13	≤ 0.01, < 0.01	4.0, 3.7	Bussey, 1999 RR 98-046B
United States Virginia, 1997 (VAC 92R)	800 WG	0.45			2	14	0.01, 0.01	4.3, 4.3	Bussey, 1999 RR 98-046B
United States Florida, 1997 (Georgia Green)	800 WG	0.45			2	14	≤ 0.01, < 0.01	1.5, 1.4	Bussey, 1999 RR 98-046B
United States Texas, 1997 (Spanco)	800 WG	0.45			2	20	< 0.01, < 0.01	1.2, 1.1	Bussey, 1999 RR 98-046B
United States Texas, 1997 (GK-7 Florunner)	800 WG	0.45			2	14	0.05, 0.06	4.7, 4.6	Bussey, 1999 RR 98-046B
United States Texas, 1997 (Florunner)	800 WG	0.45			2	14	0.01, < 0.01	8.9, 8.2	Bussey, 1999 RR 98-046B

Table 108 Azoxystrobin residues in sunflower from supervised trials in the USA

SUNFLOWER SEEDS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	Season Max kg ai/ha			
United States Minnesota, 2000 (Black oil)	800 WG	0.12 0.26 0.12			0.5	29	0.03, 0.01	Judy *et al.* 2001 RR 00-058B
United States North Dakota, 2000 (Not reported)	800 WG	0.12 0.26 0.12			0.5	29	0.01, < 0.01	Judy *et al.* 2001 RR 00-058B
United States Nebraska, 2000 (Novartis 231)	800 WG	0.12 0.26 0.12			0.5	30	0.05, 0.05	Judy *et al.* 2001 RR 00-058B
United States North Dakota, 2000 (Hysun 450)	800 WG	0.12 0.26 0.12			0.5	30	0.03, 0.03	Judy *et al.* 2001 RR 00-058B
United States South Dakota, 2000 (Croplen CL803)	800 WG	0.12 0.26 0.12			0.5	28	0.13, 0.24	Judy *et al.* 2001 RR 00-058B
United States Texas, 2000 (Triumph 571)	800 WG	0.12 0.26 0.12			0.5	29	0.08, 0.05	Judy *et al.* 2001 RR 00-058B

Table 109 Azoxystrobin residues in herbs (basil, chives, and parsley) from supervised trials in the USA

HERBS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Fresh	Dried	
BASIL									
United States Georgia, 1999 (Sweet Thai)	800 WG	0.28			6	0	48, 45	216, 235	Chen 2002 IR-4 07104
United States Florida, 1999 (Genovese)	800 WG	0.28			5	0	22, 25		Chen 2002 IR-4 07104
						7	9.4, 8.9		
						14	0.32, 0.39		
United States California, 1999 (Italian, large leaf)	800 WG	0.28			6	0	23, 16	139, 94	Chen 2002 IR-4 07104
CHIVES									
United States Idaho, 1999 (Purple Large Leaf)	800 WG	0.28			6	0	4.1, 4.2	31, 27	Chen 2004 IR-4 07105
United States Georgia, 2001 (Garlic Chives)	800 WG	0.28			6	0	7.3, 5.8		Chen 2004 IR-4 07105
United States Maryland, 2002 (Fancy)	800 WG	0.28			6	0	1.1, 1.1	27, 25	Chen 2004 IR-4 07105
United States New Jersey, 2002 (Chives, not specified)	800 WG	0.28			6	0	2.3, 2.7	33 45	Chen 2004 IR-4 07105
PARSLEY									
United States California, 2001 (Italian Dark Green)	800 WG	0.28			6	0	20, 19	165	Chen 2004 T016998-04
United States California, 2001 (Gilroy Double-cut)	800 WG	0.29			5	0	17, 11	135	Chen 2004 T016998-04

Table 110 Azoxystrobin residues in mint leaves from supervised trials in the USA

MINT LEAVES Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
Intended for processing								
United States Washington, 1998 (Scotch peppermint)	800 WG	0.28			6	7	9.2, 12	Thompson 2000 RR 00-105B
United States Washington, 1998 (Scotland 770)	800 WG	0.28			6	7	7.7, 8.0	Thompson 2000 RR 00-105B
United States Washington, 1998 (Spearmint)	800 WG	0.28			6	6	15, 17	Thompson 2000 RR 00-105B

MINT LEAVES Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Wisconsin, 1998 (Spearmint)	800 WG	0.28			6	7	4.1, 4.8	Thompson 2000 RR 00-105B
United States Wisconsin, 1998 (Redefined Murry peppermint)	800 WG	0.28			6	7	5.0, 5.8	Thompson 2000 RR 00-105B
Fresh mint leaves								
United States Florida, 1998 (Orange mint)	800 WG	0.28			6	0	25, 20	Thompson 2000 RR 00-106B
United States Florida, 1998 (Apple Mint Bowles)	800 WG	0.28			6	0	21, 21	Thompson 2000 RR 00-106B

Table 111 Azoxystrobin residues in soybean forage and hay from supervised trials in the USA

SOYBEAN FORAGE AND HAY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Forage	Hay	
United States Georgia, 1998 (NKS 75-55)	800 WG	0.28			1	0	3.2, 4.6	6.6, 6.8	Bussey and Lipton 1999 RR 99-049B
United States North Carolina, 1998 (Hyperformer 574)	800 WG	0.28			1	0	7.7, 5.6	19, 22	Bussey and Lipton 1999 RR 99-049B
United States Louisiana, 1998 (Delta Pine 3588)	800 WG	0.28			1	0	16, 20	28, 33	Bussey and Lipton 1999 RR 99-049B
United States Arkansas, 1998 (Asgrow 5901)	800 WG	0.28			1	0	18, 6.8	50, 51	Bussey and Lipton 1999 RR 99-049B
United States Mississippi, 1998 (Pioneer 9492)	800 WG	0.28			1	0	5.6, 7.2	15, 16	Bussey and Lipton 1999 RR 99-049B
United States Iowa, 1998 (L2102cn)	800 WG	0.28			1	0	10, 9.0	26, 27	Bussey and Lipton 1999 RR 99-049B
United States Iowa, 1998 (NK 30-06)	800 WG	0.28			1	0	6.8, 4.9	15, 22	Bussey and Lipton 1999 RR 99-049B

SOYBEAN FORAGE AND HAY Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Forage	Hay	
United States Illinois, 1998 (Asgrow A3244)	800 WG	0.28			1	0	7.7, 9.4	31, 24	Bussey and Lipton 1999 RR 99-049B
United States Illinois, 1998 (S30-06)	800 WG	0.28			1	0	7.0, 8.3	24, 23	Bussey and Lipton 1999 RR 99-049B
United States Illinois, 1998 (Pioneer 9281)	800 WG	0.28			1	0	8.5, 7.9	27, 21	Bussey and Lipton 1999 RR 99-049B
United States Indiana, 1998 (Pioneer 9333rr)	800 WG	0.28			1	0	12, 9.0	35, 43	Bussey and Lipton 1999 RR 99-049B
United States Indiana, 1998 (Asgrow AG3601)	800 WG	0.28			1	0	9.2, 9.9	28, 38	Bussey and Lipton 1999 RR 99-049B
United States Kansas, 1998 (S30-60)	800 WG	0.28			1	0	5.7, 7.4	8.3, 16	Bussey and Lipton 1999 RR 99-049B
United States Minnesota, 1998 (Novartis S19-90)	800 WG	0.28			1	0	9.5, 8.5	27, 34	Bussey and Lipton 1999 RR 99-049B
United States Minnesota, 1998 (T50598)	800 WG	0.28			1	0	9.0, 12	50, 53	Bussey and Lipton 1999 RR 99-049B
United States Missouri, 1998 (NK3911)	800 WG	0.28			1	0	19, 23	29, 37	Bussey and Lipton 1999 RR 99-049B
United States Nebraska, 1998 (Pioneer 92b52)	800 WG	0.28			1	0	11, 8.7	38, 31	Bussey and Lipton 1999 RR 99-049B
United States Ohio, 1998 (S30-06)	800 WG	0.28			1	0	7.1, 6.7	33, 25	Bussey and Lipton 1999 RR 99-049B
United States South Dakota, 1998 (Novartis S19-90)	800 WG	1x0.17 1x0.28			2	0	7.6, 6.7	22, 28	Bussey and Lipton 1999 RR 99-049B

Table 112 Azoxystrobin residues in barley straw and forage from supervised trials in Europe

BARLEY STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
Italy 2003 (Federal)	250 SC	0.26			2	0[a]		0.25	Sole, 2004 03-0301
						0		5.1	
						7		4.0	
						14		1.9	
						28		0.79	
						36	2.3		
Italy 2003 (Nikel)	250 SC	0.25			2	0[a]		0.82	Sole, 2004
						0		5.8	
						7		3.9	
						14		2.3	
						28		0.99	
						36	2.3		
France (south) 2003 (Nevada)	250 SC	0.25			2	0[a]		0.2	Sole 2004 03-0303
						0		5.5	
						7		3.8	
						14		0.76	
						28		0.90	
						37	1.3		
France (south) 2003 (Reine)	250 SC	0.25			2	0[a]		0.07	Sole 2004 03-0304
						0		4.2	
						7		1.8	
						14		0.66	
						28		0.48	
						36	0.63		
						46	0.65		
France 2004 (Nevada)	250 SC	0.25			2	35		1.6	Benazeraf 2005 04-0304
						43	2.9		
France 2004 (Vanessa)	250 SC	0.26			2	35		0.95	Benazeraf 2005 04-0304
						43	4.8		
France (south) 2001 (Sonja)	200 SC	0.20		400	2	42	0.82		Pointurier 2002 0112701
France (south) 2001 (Baraka)	200 SC	0.20		400	2	42	3.7		Pointurier 2002 0112702
France (south) 2001 (Baraka)	200 SC	0.20		400	2	40	2.9		Pointurier 2002 0112703
France (south) 2001 (Platine)	200 SC	0.20		400	2	40	1.6		Pointurier 2002 0112704
France (south) 2001 (Sonja)	200 SC	0.20		400	3	42	0.53		Pointurier 2002 0113201

BARLEY STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
France (south) 2001 (Sonja)	200 SC	0.20		400	3	42	0.67		Pointurier 2002 0113201
France (south) 2001 (Baraka)	200 SC	0.20			2	42	3.6		Pointurier 2002 0113202
France (south) 2001 (Baraka)	200 SC	0.20		400	2	43	1.5		Pointurier 2002 0113203
France (south) 2001 (Platine)	200 SC	0.20		400	2	41	0.84		Pointurier 2002 0113204
France 1993 (Express)	250 SC	0.16			3	37	0.53		Renard and Sapiets 1994 RJ1744B
	250 SC	0.25			3	37	1.3		
France (south) 1993 (Pastoral)	250 SC	0.18		300	3	21		0.57	Sapiets 1994 RJ1766B
						1		6.5	
						10		3.3	
						19		2.1	
						27		1.3	
						35	0.91		
	400 WG	0.25		300	3	21		0.50	
						1		8.5	
						10		2.6	
						19		1.7	
						27		1.0	
						35	0.91		
France (south) 1993 (Volga)	250 SC	0.17			3	14		0.59	Sapiets 1994 RJ1766B
						1		1.2	
						7		0.59	
						13		0.31	
						19		0.44	
						26	0.60		
	400 WG	0.25		300	3	14		0.44	
						1		0.87	
						7		0.54	
						13		0.27	
						19		0.40	
						26	0.60		
France 1993 (Plaisant)	250 SC	0.16			3	37	0.57		Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	37	0.72		
France 1993 (Plaisant)	250 SC	0.16			3	47	0.60		Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	47	0.92		

BARLEY STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
France 1994 (Baraka)	250 SC	0.25			3	BLA		1.4	Sapiets 1995 RJ1918B
						0		10	
						10		1.4	
						20		1.1	
						28		1.1	
						35	1.2		
France 1994 (Labea)	250 SC	0.25			3	BLA		0.62	Sapiets 1995 RJ1918B
						0		5.1	
						11		0.87	
						19		0.70	
						27		0.72	
						35	1.3		
France 1994 (Intro)	250 SC	0.25			3	BLA		0.91	Sapiets 1995 RJ1918B
						0		5.6	
						11		1.0	
						19		0.57	
						27		1.1	
						35	1.6		
Spain 2003 (Astoria)	250 SC	0.25			2	0[a]		0.12	Sole 2004 03-0305
						0		4.0	
						7		1.9	
						14		1.8	
						28		0.22	
						35	1.2		
Spain 2004 (Germania)	250 SC	0.26			2	38	5.5		Benazeraf 2005 04-0305
Spain 2004 (Sultane)	250 SC	0.25			2	35		0.48	Benazeraf 2005 04-0305
						49	2.5		
Netherlands 2003 (Barke)	250 SC	0.25			2	0[a]		0.02	Benazeraf 2004 03-0407
						0		3.8	
						7		1.6	
						14		1.1	
						28		0.39	
						37	1.5		
Switzerland 2003 (Henna)	250 SC	0.26		309	2	0[a]		0.51	Benazeraf 2004 03-0408
						0		3.9	
						7		1.1	
						14		0.39	
						28		0.25	
						36	0.48		
						49	0.48		
Switzerland 2003 (Landi)	250 SC	0.26		311	2	0[a]		0.26	Benazeraf 2004 03-0418
						0		3.1	
						7		0.75	
						14		0.41	
						28		0.23	
						36	0.38		
						47	0.39		

BARLEY STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
United Kingdom 2004 (Carat)	250 SC	0.25			2 GS 51–61[b]	63	0.50		Benazeraf 2005 04-0403
United Kingdom 2004 (Pearl)	250 SC	0.25			2 GS 55–59[b]	67	0.91		Benazeraf 2005 04-0403
United Kingdom 2003 (Halcyon)	250 SC	0.25			2 GS 55–59[b]	0[a]		0.61	Benazeraf 2004 03-0406
						0		3.1	
						7		0.73	
						14		0.30	
						28		0.62	
						35	1.3		
						60	0.31		
United Kingdom 1993 (Bronze)	250 SC	0.16			3 GS 70–71[b]	13		1.2	Hall *et al*. 1994 RJ1722B
						1		7.5	
						10		0.83	
						18		0.94	
						29		0.97	
						54	1.0		
	250 SC	0.25			3 GS 70–71[b]	13		0.87	
						1		8.7	
						10		1.3	
						18		1.1	
						29		1.2	
						54	1.6		
United Kingdom 1994 (Pastoral)	250 SC	0.25			3 GS 69–71[b]	BLA		0.36	Sapiets 1995 RJ1899B
						0		4.0	
						10		2.7	
						19		2.1	
						28		2.6	
						38	4.5		
United Kingdom 1994 (Pipkin)	250 SC	0.25			3 GS 69–71[b]	BLA		0.55	Sapiets 1995 RJ1899B
						0		5.0	
						14		4.0	
						28		3.0	
						38		2.4	
						53	3.4		
United Kingdom 1994 (Fighter C2 Hancock seed)	250 SC	0.25			3 GS 65–69[b]	BLA		1.3	Sapiets 1995 RJ1899B
						0		11	
						10		2	
						19		1.6	
						28		0.89	
						55	2.1		
Germany 1994 (Teo)	250 SC	0.25			3	0		8.6	Tillkes 1995 ZEN-9403
						19		0.82	
						35	2.2		
Germany 1993 (Hanna)	250 SC	0.17			3	59	0.42		Sapiets 1994 RJ1756B
	250 SC	0.26			3	59	0.45		

BARLEY STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
Germany 1993 (Sissy)	250 SC	0.17			3	14		0.24	Burke and Sapiets 1994 RJ1762B
						1		1.2	
						8		0.43	
						20		0.20	
						30		0.12	
						44	0.15		
	250 SC	0.26			3	14		0.38	
						1		1.4	
						8		0.6	
						20		0.38	
						30		0.22	
						44	0.22		
Germany 1994 (Teo)	250 SC	0.25			3	0		11	Sapiets 1995 RJ1870B
						19		1.8	
						35	2.9		
Sweden 1994 (Golf)	250 SC	0.25		200	2	42	5.3		Sapiets 1995 RJ1900B
Germany 1995 (Hanna)	200 SC	0.20		300	3	0		3.4	Burke 1996 RJ2070B
						22	1.8		
						33	2.2		
Germany 2001 (Carreo)	200 SC	0.20		300	2	37	0.58		Simon 2002 Gba32301
						49	0.45		
Germany 2001 (Theresa)	200 SC	0.20		300	2	34	1.5		Simon 2002 gba92301
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.60		Pointurier 2002 2071/01
						43	0.61		
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.64		Pointurier 2002 2072/01
						43	0.94		
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.71		Pointurier 2002 2073/01
						43	0.51		
Switzerland 2001 (Pleasant)	200 SC	0.20		400	2	35	0.37		Pointurier 2002 2074/01
						43	0.50		

[a] Before final application

[b] Growth stage at the last application.

Table 113 Azoxystrobin residues in oat straw and forage from supervised trials in Germany

OAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
Germany 1995 (Lutz)	200 SC	0.20		300	3	0		6.7	Burke 1996 RJ2070B
						20		1.8	
						33	3.0		

OAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
Germany 1994 (Salomon)	250 SC	0.25			3	0		8.0	Sapiets 1995 RJ1870B
						21		1.0	
						35	1.0		
Germany 1994 (Salomon)	250 SC	0.25			3	0		8.1	Tillkes 1995 ZEN-9403
						21		1.5	
						36	1.5		

Table 114 Azoxystrobin residues in rye straw and forage from supervised trials in Germany

RYE STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (forage)	
Germany 1994	250 SC	0.25			3	0		5.4	Tillkes 1995 ZEN-9403
						21		1.4	
						35	1.7		
						42	2.7		
Germany 1995 (Rapid)	200 SC	0.20		300	3	0		4.5	Burke 1996 RJ2070B
						23		0.90	
						35	1.2		
						44	2.0		

Table 115 Azoxystrobin residues in triticale straw and forage from supervised trials in Germany

TRITICALE STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
Germany 1994 (Modus)	250 SC	0.25			3	0		8.1	Sapiets 1995 RJ1870B
						22		0.64	
						36	0.99		
						44	1.5		
Germany 1994	250 SC	0.25			3	0		11	Tillkes 1995 ZEN-9403
						22		0.54	
						36	1.4		
						44	0.84		

Table 116 Azoxystrobin residues in wheat straw and forage from supervised trials in Europe

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
Italy 2003 (Violet)	250 SC	0.25		252	2	0[a]		2.6	Benazeraf 2004 03-0306
						0		6.3	
						7		5.4	
						14		1.2	
						28		1.5	
						35	1.6		

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
Italy 2003 (Soisson)	250 SC	0.26		257	2	0[a]		2.8	Benazeraf 2004 03-0307
						0		7.0	
						7		4.0	
						14		1.8	
						28		2.4	
						35	3.8		
France (south) 2003 (Rapport)	250 SC	0.26		261	2	0[a]		0.5	Benazeraf 2004 03-0308
						0		3.4	
						7		1.9	
						14		1.3	
						28		1.9	
						35	3.5		
France (south) 2003 (Sezanne)	250 SC	0.25		249	2	0[a]		0.55	Benazeraf 2004 03-0309
						0		5.0	
						7		1.4	
						14		1.2	
						28		0.86	
						34	2.4		
						40	3.2		
France (north) 2003 (Apache)	250 SC	0.25		300	2	0[a]		0.32	Sole 2004 03-0403
						0		5.0	
						7		1.6	
						14		0.45	
						28		0.35	
						35	0.58		
						48	0.75		
France (south) 2004 (Galibie)	250 SC	0.25		201	2	38		1.9	Benazeraf 2005 04-0302
						47	2.0		
France (south) 2004 (Soissons)	250 SC	0.26		207	2	35	6.2		Benazeraf 2005 04-0302
France 1993 (Soissons)	250 SC	0.17			3	70	0.34		Renard and Sapiets 1994 RJ1744B
	250 SC	0.25			3	70	1.1		
France (south) 1993 (Soissons)	250 SC	0.17		300	3	14		0.42	Atger *et al.* 1994 RJ1766B
						1		1.1	
						12		0.26	
						22		0.23	
						32		0.12	
						39	0.24		
	400 WG	0.25		300	3	14		0.61	
						1		1.0	
						12		0.44	
						22		0.29	
						32		0.17	
						39	0.36		

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
France (south) 1993 (Florence-Aurore)	250 SC	0.17		300	3	16		0.37	Atger *et al.* 1994 RJ1766B
						1		5.0	
						7		3.2	
						14		1.9	
						22		2.5	
						31	2.3		
	400 WG	0.25		300	3	16		0.41	
						1		5.8	
						7		3.2	
						14		2.7	
						22		2.4	
						31	2.7		
France 1993 (Manital)	250 SC	0.16			3	28	12		Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	28	15		
France 1993 (Gala)	250 SC	0.17			3	35	0.98		Sapiets *et al.* 1995 RJ1775B
	400 WG	0.25			3	35	2.3		
France 1994 (Manital)	250 SC	0.25			3	BLA 0		0.78 7.6	Sapiets *et al.* 1994 RJ1918B
						9		4.2	
						20		3.7	
						28		3.7	
						35	1.8		
France 1994 (Courtot)	250 SC	0.25			3	BLA 0		1.9 6.8	Sapiets *et al.* 1994 RJ1918B
						12		3.6	
						22		2.3	
						30		1.5	
						40	2.5		
France 1994 (Soisson)	250 SC	0.25			3	BLA 0		2.0 8.3	Sapiets *et al.* 1994 RJ1918B
						12		2.0	
						22		0.97	
						30		0.76	
						40	1.7		
Spain 2003 (Cartaya)	250 SC	0.25		251	2	0[a]		0.48	Benazeraf 2004 03-0310
						0		8.5	
						7		1.8	
						14		1.3	
						28		1.3	
						35	1.9		
						43	1.8		
Spain 2004 (Kilopondio)	250 SC	0.25		205	2	35		2.4	Benazeraf 2005 04-0303
						41	3.5		
Spain 2004 (Lanza)	250 SC	0.25		200	2	35	1.2		Benazeraf 2005 04-0303

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
United Kingdom 2003 (Tanker)	250 SC	0.25		200	2 GS 67–69[b]	0[a]		0.30	Sole 2004 03-0401
						0		3.2	
						7		0.61	
						14		0.32	
						28		0.29	
						35	0.65		
						53	0.03		
United Kingdom 2003 (Hereward)	250 SC	0.25		200	2 GS 69[b]	0[a]		0.28	Sole 2004 03-0402
						0		3.8	
						7		2.9	
						14		0.89	
						28		0.80	
						35	1.5		
						58	1.6		
United Kingdom 2004 (Deben)	250 SC	0.25		202	2 GS 69[b]	35		0.40	Benazeraf 2005 04-0308
						61	1.6		
United Kingdom 2004 (Hereward)	250 SC	0.25		198	2 GS 69[b]	35		0.51	Benazeraf 2005 04-0308
						50	1.5		
United Kingdom 1993 (Spark)	250 SC	0.17			3 GS 70–71[b]	14		0.94	Hall *et al.* 1994 RJ1722B
						1		6.4	
						10		5.0	
						23		1.4	
						31		1.0	
						59	2.7		
	250 SC	0.25			3 GS 70–71[b]	14		1.2	
						1		7.5	
						10		6.1	
						23		1.8	
						31		1.6	
						59	2.3		
United Kingdom 1994 (Soisson)	250 SC	0.25			3 GS 71[b]	BLA		0.23	Sapiets 1995 RJ1899
						0		5.6	
						10		3.2	
						18		1.1	
						28		0.83	
						40	1.6		
United Kingdom 1994 (Apollo)	250 SC	0.25			3 GS 65–71[b]	48	5.7		Sapiets 1995 RJ1899
United Kingdom 1994 (Beaver)	250 SC	0.25			3 GS 69[b]	BLA		0.52	Sapiets 1995 RJ1899
						0		5.9	
						10		1.7	
						19		1.5	
						28		1.3	
						39	1.1		
Germany 1993 (Orestis)	250 SC	0.17			3	63	0.23		Burke and Sapiets 1994 RJ1756B
	250 SC	0.25			3	63	0.24		

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
Germany 1993 (Nandu)	250 SC	0.17			3	17		0.27	Burke and Sapiets 1994 RJ1762B
						1		3.7	
						10		1.9	
						21		0.46	
						30		0.23	
						53	0.27		
	250 SC	0.25			3	17		0.56	
						1		4.8	
						10		2.5	
						21		0.90	
						30		0.50	
						53	0.54		
Germany 1994 (Mieka)	250 SC	0.25			3	0		8.4	Sapiets 1995 RJ1870B
						21		5.0	
						33	15		
Germany 1994 (Kraka)	250 SC	0.25				0		11	Tillkes 1995 ZEN-9403
						21		2.7	
						35	1.7		
Switzerland 2003 (Levis)	250 SC	0.27		247	2	0[a]		0.20	Sole 2004 03-0404
						0		6.5	
						7		1.1	
						14		0.51	
						28		0.44	
						35	0.58		
Switzerland 2003 (Arina)	250 SC	0.26		307	2	0[a]		0.18	Sole 2004 03-0414
						0		3.2	
						7		1.1	
						14		0.87	
						28	2.0	1.6	
Switzerland 2001 (Albis)	200 SC	0.20		400	2	35	0.41		Pointurier 2002 2075/01
						47	0.21		
Switzerland 2001 (Galaxy)	200 SC	0.20		400	2	35	0.46		Pointurier 2002 2076/01
						47	0.21		
Switzerland 2001 (Albis)	200 SC	0.20		400	2	35	0.22		Pointurier 2002 2077/01
						47	0.18		
Switzerland 2001 (Galaxy)	200 SC	0.20		400	2	35	0.41		Pointurier 2002 2078/01
						47	0.21		
Germany 1995 (Monopol)	200 SC	0.20		300	3	0		4.8	Burke 1996 RJ2070B
						21		0.59	
						36	0.50		
Germany 2001 (Aristos)	200 SC	0.20		300	2	35	0.20		Simon 2002 gwh32401
						50	0.36		
Germany 2001 (Kornett)	200 SC	0.20		300	2	42	1.2		Simon 2002 gwh92401
France (south) 2001 (Apache)	200 SC	0.20		400	2	42	0.83		Pointurier 2002 0112901

WHEAT STRAW, FORAGE Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Straw	Whole plant (Forage)	
France (south) 2001 (Apache)	200 SC	0.20		300	2	42	0.81		Pointurier 2002 0112902
France (south) 2001 (Eureka)	200 SC	0.20		400	2	42	2.4		Pointurier 2002 0113301
France (south) 2001 (Grazia)	200 SC	0.20		400	2	41	0.73		Pointurier 2002 0113302

[a] Before final application

[b] Growth stage at the last application.

Table 117 Azoxystrobin residues in maize forage and fodder from supervised trials in the USA

MAIZE FORAGE AND FODDER Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Fodder	Forage[a]	
United States New York, 1998 (Agway 257)	800 WG	0.28			8	6 7	4.8, 9.3	 0.78, 0.83	Bussey, 1999 RR 99-050B
United States North Carolina 1998 (Pioneer 3167)	800 WG	0.28			8	6	1.8, 5.2	1.2, 1.2	Bussey, 1999 RR 99-050B
United States Florida, 1998 (Pioneer 3140)	800 WG	0.28			8	7	7.2, 7.8	3.6, 2.0	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (N 46-40 BY)	800 WG	0.28			8	7	2.6, 1.9	0.88, 1.1	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (NK 7070 BT)	800 WG	0.28			8	7	4.1, 4.4	0.66, 0.94	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	6 7	2.7, 3.2	 0.95, 1.7	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	6 7	6.1, 8.7	 0.56, 0.58	Bussey, 1999 RR 99-050B
United States Illinois, 1998 (Pioneer 3394)	800 WG	0.28			8	7	4.0, 3.0	0.46, 1.2	Bussey, 1999 RR 99-050B
United States Indiana, 1998 (Pioneer 33A14 Hybrid)	800 WG	0.28			8	6	4.4, 4.7	1.6, 2.8	Bussey, 1999 RR 99-050B
United States Indiana, 1998 (Pioneer 34G81 Hybrid)	800 WG	0.28			8	6	2.4, 2.5	3.8, 3.5	Bussey, 1999 RR 99-050B
United States Minnesota, 1998 (Pioneer 3568)	800 WG	0.28			8	7	1.1, 0.95	0.13, 0.49	Bussey, 1999 RR 99-050B

MAIZE FORAGE AND FODDER Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg		Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max		Fodder	Forage[a]	
United States Minnesota, 1998 (N 2555 Bt))	800 WG	0.28			8	6	2.5, 2.6	2.8, 2.2	Bussey, 1999 RR 99-050B
United States Missouri, 1998 (Pioneer 3568)	800 WG	0.28			8	6	3.1, 2.9	0.74, 1.5	Bussey, 1999 RR 99-050B
United States Nebraska, 1998 (Pioneer 3406)	800 WG	0.28			8	6	2.9, 2.6	1.8, 2.4	Bussey, 1999 RR 99-050B
United States Nebraska, 1998 (Pioneer 34R06)	800 WG	0.28			8	6 7	 16, 8.4	2.8, 1.5	Bussey, 1999 RR 99-050B
United States Iowa, 1998 (DK 566)	800 WG	0.28			8	7	0.88, 0.85	0.65, 0.61	Bussey, 1999 RR 99-050B
United States Ohio, 1998 (Pioneer 3394)	800 WG	0.28			8	7	8.7, 5.8	2.5, 2.7	Bussey, 1999 RR 99-050B
United States Wisconsin, 1998 (NK 4242)	800 WG	0.28			8	6 7	5.3, 3.4	 0.67, 1.0	Bussey, 1999 RR 99-050B
United States Texas, 1998 (Mycogen 2868)	800 WG	0.28			8	7	20, 21	2.8, 2.9	Bussey, 1999 RR 99-050B
United States Washington, 1998 (Hybritech Hybrid)	800 WG	0.28			8	7	3.5, 1.6	1.7, 7.2	Bussey, 1999 RR 99-050B

[a] Forage was harvested at the milk stage, 6–7 days after the 6th application of azoxystrobin.

Table 118 Azoxystrobin residues in rice straw from supervised trials in the USA

RICE STRAW Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	Season Max kg ai/ha			
United States Arkansas, 1995 (Kay Bonnet)	800 WG	0.22(2×)+0.34			0.78	27	4.2, 3.8	Sapiets 1996 RJ2201B
United States Arkansas, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	27	6.9, 5.0	Sapiets 1996 RJ2201B
United States Arkansas, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	28	3.2, 2.0	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	0.83, 0.84	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	27	0.52, 0.59	Sapiets 1996 RJ2201B
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	28	0.81, 0.91	Sapiets 1996 RJ2201B

RICE STRAW Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	Season Max kg ai/ha			
United States Louisiana, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	28	3.5, 4.2	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	0.62, 0.57	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	27	2.4, 2.6	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	26	3.7, 4.1	Sapiets 1996 RJ2201B
United States Mississippi, 1995 (Lemont)	800 WG	0.22(2×)+0.34			0.78	28	1.5, 2.7	Sapiets 1996 RJ2201B
United States Missouri, 1995 (Allen)	800 WG	0.22(2×)+0.34			0.78	28	0.78, 0.71	Sapiets 1996 RJ2201B
United States Texas, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	26	5.0, 5.0	Sapiets 1996 RJ2201B
United States Texas, 1995 (Cypress)	800 WG	0.22(2×)+0.34			0.78	26	1.9, 1.5	Sapiets 1996 RJ2201B
United States California, 1995 (M-103)	800 WG	0.22(2×)+0.34			0.78	28	7.5, 10	Sapiets 1996 RJ2201B
United States California, 1995 (M-202)	800 WG	0.22(2×)+0.34			0.78	28	6.1, 6.4	Sapiets 1996 RJ2201B

Table 119 Azoxystrobin residues in sugar beet tops from supervised trials in the USA

SUGARBEET TOPS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States Michigan, 1998 (E-4 Monitor Sugar)	800 WG	0.37			6	0	9.5, 7.7	Bussey 1999 RR99-036B
United States Minnesota, 1998 (Crystal 222)	800 WG	0.37			6	0	8.7, 8.3	Bussey 1999 RR99-036B
United States Minnesota, 1998 (Monohikari)	800 WG	0.37			6	0	25, 17	Bussey 1999 RR99-036B
United States Minnesota, 1998 (Beta seed Kw 1880)	800 WG	0.37			6	0	20, 22	Bussey 1999 RR99-036B
United States Montana, 1998 (Ach 192)	800 WG	0.37			6	0	4.6, 5.8	Bussey 1999 RR99-036B

SUGARBEET TOPS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United States North Dakota 1998 (Monohikari)	800 WG	0.37			6	0	16, 12	Bussey 1999 RR99-036B
United States Colorado, 1998 (Seedex XI)	800 WG	0.37			6	0	11, 9.2	Bussey 1999 RR99-036B
United States California, 1998 (Ss-7B1r)	800 WG	0.37			6	0	16, 13	Bussey 1999 RR99-036B
United States Idaho, 1998 (P-M9 Hilleshog)	800 WG	0.37			6	0	44, 31	Bussey 1999 RR99-036B

Table 120 Azoxystrobin residues in dried hops from supervised trials in Germany and the UK

DRIED HOPS Country Year (variety)	Application					PHI days	Azoxystrobin residue, mg/kg	Author, Date Study No.
	Form g ai/L	kg ai/ha	kg ai/hL	Water L/ha	No./ max			
United Kingdom 1998 (Whitbread Golding)	250 SC	0.4			6	28	1.1	Lister 1999 RJ2801B
United Kingdom 1998 (Target)	250 SC	0.4			6	28	1.3	Lister 1999 RJ2801B
United Kingdom 1999 (Whitbread Golding)	250 SC	0.2 (2×)+ 0.3(2×)+ 0.4 (2×)	0.015	1410–2700	6	27	0.83	Gill 2000 RJ2981B
United Kingdom 1999 (Target)	250 SC	0.2 (2×)+ 0.3(2×)+ 0.4 (2×)	0.015	1410–2700	6	28	2.2	Gill 2000 RJ2981B
Germany 1998 (Perle)	250 SC	0.25 (2×)+ 0.30 (2×)+ 0.40 (2×)	0.015	1500–2700	6	28	5.7	Gill 1999 RJ2841B
Germany 1998 (Hallertauer Magnum)	250 SC	0.23 (2×)+ 0.30 (2×)+ 0.41 (2×)	0.015	1500–2700	6	26	11	Gill 1999 RJ2841B
Germany 1999 (Perle)	250 SC	0.25 (2×)+ 0.36 (2×)+ 0.45 (2×)	0.015	1500–2700	6	28	10, 11	Gill 2000 RJ3015B
Germany 1999 (Spalter Select)	250 SC	0.25 (2×)+ 0.36 (2×)+ 0.45 (2×)	0.015	1500–2700	6	26	12, 12	Gill 2000 RJ3015B

Fate of residues in storage and processing

In storage

No information was received on residues of azoxystrobin during periods of storage representing a normal commercial practice.

In processing

The Meeting received information on the fate of azoxystrobin residues during processing of oranges, grapes, plums, tomato, barley, maize, rice, wheat, soybeans, sunflower, and peanuts and on azoxystrobin fate under hydrolysis conditions simulating commercial food processing.

A hydrolysis study was carried out to assess the possible breakdown or reaction products from azoxystrobin residues in the raw products during processing (Grout, 2002; RJ3296B). [^{14}C-Phenylacrylate]azoxystrobin was incubated in aqueous buffer solutions at a nominal concentration of 5 mg/L under three sets of conditions, each designed to simulate an appropriate process: 90 °C (pH 4, 20 min) to simulate pasteurization, 100 °C (pH 5, 60 min), to simulate boiling, baking and brewing, and 120 °C (pH 6, 20 min.) to simulate sterilization. Radioactive components were characterized by fractionation and co-chromatography with authenticated reference compounds using TLC and bio-imaging and/or HPLC. Control samples were prepared for each buffer and maintained at ambient temperature for one hour.

After incubation, total recoveries of applied radioactivity ranged from 98% to 105% for all samples (see Table 121). The recovery for the controls was between 97% and 103% and indicated no degradation of azoxystrobin. Mean values of amounts of azoxystrobin remaining after incubation were 101% at pH 4, 97% at pH 5, and 98% at pH 6. No breakdown or reaction products were formed during hydrolysis of azoxystrobin under representative processing conditions.

Table 121 Azoxystrobin and total radioactivity recovery in a hydrolysis study simulating typical processing conditions

Component	% of applied radioactivity					
	pH 4, 90 ºC, 20 min (pasteurization)		pH 5, 100 ºC, 60 min (boiling, baking, brewing)		pH 6, 120 ºC, 120 min (sterilization)	
Azoxystrobin	100	102	96	97	96	99
Total radioactivity	102	105	98	100	99	101

Processing of oranges

A processing study was carried out during 1998 from oranges obtained in a trial in the USA (Bussey and Hampton, 1999; RR-99-017B). Six applications of azoxystrobin formulated as a 800 g ai/kg WG was applied to orange trees at the rate of 0.28 kg ai/ha. Applications were made at intervals of 6–8 days, with the last application on the day of harvest (a PHI of 0 days). Oranges were processed to dried pulp, cold-pressed oil, and fresh juice.

Processing followed commercial practices. Oranges were washed with agitation for about 30 seconds and juice was extracted from the washed fruits with a commercial in-line juice extractor. An emulsion consisting of extracted oil, water, and peel frits was collected. The juice stream was passed through a finisher, which screens extra pulp from the juice. The juice was then collected. The oil, water and peel frits emulsion was also passed through another finisher to separate the peel frits from the oil-water emulsion. The peel frits were collected. The oil-water emulsion was further screened and the emulsion allowed to separate for about five hours. After removing water, the emulsion was centrifuged and the cold-pressed oil was further purified by sequential freezing, thawing, filtering, and adding anhydrous sodium sulfate to remove remaining water. The final mass of oil fraction was then removed. The dried pulp, juice, and oil were packed and shipped frozen to the laboratory where they were maintained frozen until analysis for about 285 days. Azoxystrobin residues and processing factors are summarized in Table 122.

Table 122 Azoxystrobin residues in orange and processed fractions

Processed Fractions	Azoxystrobin residues mg/kg	Processing factor	Reference
Orange (RAC)	0.11, 0.12 (0.12)		Bussey and Hampton, 1999 RR 99-017B
Dried pulp	0.23, 0.23 (0.23)	1.9	
Cold-pressed oil	0.55, 0.59 (0.57)	4.8	
Juice	< 0.01, < 0.01 (< 0.01)	< 0.08	

Processing of grapes

In two trials conducted in France in 1993, azoxystrobin was applied eight times using either a 0.025 kg ai/hL spray concentration (500 WG formulation) or a 0.017 kg ai/hL spray concentration (250 SC formulation) (Sapiets, et al., 1995; RJ1815B). Two similar trials were conducted in Italy during the same period (Bonfanti, *et al.*, 1995; RJ1739B). Samples of ripe fruits were taken for processing at harvest, 21 days after the final application. Samples of the raw agricultural commodity (RAC) were frozen and sent to the laboratory where they remained frozen until analysis (ten months for the Italian trials and 12 months for the trials in France). Samples for processing were transported in refrigerated vans to the processing facility. Grapes were processed into wine following commercial practices. Samples of processed fractions were taken and stored frozen for analysis. Azoxystrobin residues and processing factors are summarized in Table 123.

Table 123 Azoxystrobin residues in grapes and processed fractions obtained in trials in France (Sapiets et al., 1995; RJ1815B) and Italy (Bonfanti *et al*., 1995; RJ1739B)

Processed fractions	Azoxystrobin residues (mg/kg)				Processing factors				
	0.017 kg ai/hL		0.025 kg ai/hL		0.017 kg ai/hL		0.025 kg ai/hL		Median
	France	Italy	France	Italy	France	Italy	France	Italy	
Grapes (RAC)	0.23	0.23	0.37	0.32					
Must	0.08	0.16	0.12	0.29	0.35	0.70	0.32	0.91	0.52
Pomace	0.39	0.87	0.92	1.5	1.7	3.8	2.5	4.7	3.1
Wine	0.11	0.2	0.13	0.33	0.48	0.87	0.35	1.0	0.67
Pasteurized wine	0.07	0.13	0.19	0.32	0.30	0.57	0.51	1.0	0.54
Distillate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.04	< 0.04	< 0.03	< 0.03	< 0.04
Spirit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.04	< 0.04	< 0.03	< 0.03	< 0.04
Stem	1.1	0.97	2.2	1.3	4.8	4.2	5.9	4.1	4.5
Skin	0.53	0.49	0.73	0.57	2.3	2.1	2.0	1.8	2.1
Juice	0.09	0.08	0.14	0.08	0.39	0.35	0.38	0.25	0.36
Dry pomace	1.2	1.3	1.8	1.1	5.2	5.7	4.9	3.4	5.0

The effect of drying on residues of azoxystrobin on grapes has been investigated in the USA in 1994 (Sapiets and Roper, 1995; RJ1863B). Azoxystrobin was applied six times to grape vines at the rate of 0.28 kg ai/ha and samples of mature fruits were taken for analysis 19 days after the final application. A second sample was taken at the same time and dried in the sun to produce raisins. Azoxystrobin residues and processing factors are summarized in Table 124.

Table 124 Azoxystrobin residues in raisins after processing from treated grapes

Processed Fractions	Residues mg/kg	Processing factor	Reference
Grapes (RAC)	0.71		Sapiet and Roper 1995 RJ1863
Raisin	0.32	0.45	
Raisin waste	8.9	13	

Processing of plums

A processing study was carried out in plums during 1997 in the USA (Bussey, 1998; RR 98-015B). Eight applications of azoxystrobin (formulated as an 800 WG formulation) were applied to plum trees at the rate of 0.28 kg ai/ha. Treatments were made at intervals of 7–10 days, with the sixth application made 20 days before harvest. Samples of plums were collected six days after the last application and were processed to prunes, following commercial procedures. Fresh plums were washed in cold water for five minutes. Stems, leaves and other debris were removed. The washed fruit was then placed on

trays in an air dryer at 75 ºC and dried for 23 hours to a moisture content of 27% (untreated prunes) or 20% (treated pruned). The commercial standard is 19–29% moisture. After cooling, the dried prunes were frozen for about 72 days until analysis. Azoxystrobin residues and processing factors are summarized in Table 125.

Table 125 Azoxystrobin residues in prunes after processing from treated plums

Processed Fractions	Residues mg/kg	Processing factor	Reference
Plums (RAC)	0.31, 0.30 (0.31)		Russey, 1995 RR 98-015B
Prunes	0.06, 0.05 (0.06)	0.19	

Processing of tomato

Two processing trials on tomatoes were carried out in Italy during 1997 (Clarke and Bofanti, 1998; RJ2488B). Six to seven applications of a 250 SC formulation of azoxystrobin were applied at 0.025 kg ai/hL. Duplicate samples of fruit were taken three days after the final application and were analysed for azoxystrobin. Additional samples were taken and sent for processing.

Processing was performed following commercial practices. The tomatoes were washed using cold water and a sample was taken and frozen for analysis. Washed tomatoes were dipped four times in boiling water for 20 seconds. After draining the tomatoes were peeled and allowed to cool. Samples of peeled tomato and tomato peel were frozen for analysis. The following processed samples were prepared:

(i) Tomato puree samples were prepared by washing the whole fruit and placing in a cutter/mixer which was warmed to 70 ºC for 20 minutes. The heated crushed tomatoes were then pressed through a sieve and the resulting puree was concentrated at 90–93 ºC and allowed to cool. The puree sample was frozen for analysis.

(ii) Tomato ketchup samples were prepared by washing whole tomatoes, heating in the cutter/mixer, sieving and then adding water, vinegar, sodium chloride, sugar and starch. This mixture was homogenized, concentrated at 90–93 ºC and then allowed to cool. The resulting tomato ketchup was frozen for analysis.

(iii) Tomato juice was produced by extracting washed tomato fruit using a juice extractor. The juice was warmed to 80 ºC for ten minutes. After cooling the juice was frozen for analysis.

(iv) Tomato conserve samples were prepared by dipping washed whole fruits in boiling water (90–95 ºC) for 20 seconds. After peeling, the fruits were placed under water and sterilized for 45 minutes at 90–95 ºC. On cooling, the conserved tomato samples were frozen for analysis.

A trial was also carried out in 1994 in the US (Sapiets and Roper, 1996; RJ2006B). Azoxystrobin was applied eight times at approximately weekly intervals up to harvest, at the rate of 0.12 kg ai/ha. Mature fruits were taken one day after the final application and the fruits were processed into juice, puree, paste, wet and dry pomace, following commercial practices. Residues of azoxystrobin were determined in each processed fraction.

In general, processing procedures were similar to the above, except that the juice went through the canning process. The preparation of tomato puree also differed from that previously described above. A portion of the juice was concentrated to produce puree. The juice was placed in a vacuum evaporator and recirculated until the natural tomato soluble solids had reached the desired value for puree. A portion of the resulting puree was placed in a steam jacket kettle and heated to 190 ºF. The heated puree was placed in cans, the cans sealed, cooled in a water bath and then placed

in a freezer. The remaining puree was placed back in the evaporator and condensed further to paste and then canned.

Table 126 Azoxystrobin residues in tomatoes and processed fractions obtained in two trials in Italy (Clarke and Bofanti, 1998; RJ2488) and one trial in the USA (Sapiets and Roper, 1996; RJ2006B)

Processed fractions	Azoxystrobin residues (mg/kg)			Processing factors			
	Italy	Italy	USA	Italy	Italy	USA	Median[a]
Tomato (RAC)	0.07	0.11	0.05				
Washed tomato	0.05	0.07		0.71	0.64		0.68
Peeled tomato	< 0.01	< 0.01		< 0.14	< 0.09		< 0.12
Peel	0.13	0.14		1.9	1.3		1.6
Puree	0.1	0.06	0.04	1.4	0.55	0.80	0.80
Paste			0.13			2.6	2.6
Ketchup	0.04	0.04		0.57	0.36		0.47
Juice	0.02	0.04	0.02	0.29	0.36	0.40	0.36
Conserve	< 0.01	< 0.01		< 0.14	< 0.09		< 0.12
Wet pomace			0.46			9.2	9.2
Dry pomace			1.2			24	24

[a]Average calculated for two values.

Processing of barley into beer

A processing study was carried out in the UK in 1996 (Sapiets and Hall, 1998; RJ2452B). Azoxystrobin was applied twice as a 250 g ai/L SC formulation at the rate of 0.25 kg ai/ha followed by an application at 0.50 kg ai/ha. Grain samples taken 7–8 weeks after the final application were sent for processing into beer, following commercial practices.

Grain was malted using alternate wet/dry schedule at 15–17.5 ºC, then allowed to germinate for five days at a temperature rising from 15 to 21 ºC. Samples of malt and rootlets, which had been separated from the kilned malt, were taken and frozen. The malted grain was mashed at 64 ºC for an hour, then hops were added and the resulting wort heated to boiling. The mixture was allowed to cool, the accumulated sediment removed, and the wort inoculated with yeast and left to ferment for six days. The spent yeast was removed and a sample taken for analysis. The resulting beer was left to mature for two weeks then filtered and bottled.

Table 127 Azoxystrobin residues in barley grain and processed fractions in beer production

Processed Fractions	Azoxystrobin residues (mg/kg)	Processing factor	Reference
Barley grain	0.40		Sapiets and Hall 1998 RJ2452B
Roots	0.18	0.45	
Malt	0.04	0.10	
Spent grain	0.06	0.15	
Beer	0.01	0.03	

Processing of maize

A processing study using dry and wet milling was conducted in 1998 on maize grain from a single trial in the US (Bussey and Aston, 1999; RR 99-056B). Azoxystrobin was applied eight times at the rate of 1.4 kg ai/ha and maize grain was harvested six days after the last application. Maize grain samples were processed using both dry milling and wet milling procedures, following commercial practices in the USA. The resulting processed commodities from wet milling were starch and refined oil. Meal, grits, flour, and refined oil were produced from dry milling. Aliquots of unprocessed grain and processed commodities were analysed for residues of azoxystrobin (see Table 128).

In dry milling, the maize grain adjusted to 20–22% moisture was impact milled and the resulting cornstock dried at 54–70 ºC. The dried cornstock was screened to produce hulls, grit, meal, flour and germ. The germ was heated to 71–79 ºC, flaked and then extracted with hexane at 50–60 ºC.

Crude oil was recovered from the miscella by heating to 73–90 ºC. Refined oil was produced by adding sodium hydroxide and separating the soapstock.

In wet milling, maize grain was steeped in water containing 0.1–0.2% sulfur dioxide at 50–54 ºC for about 46 hours. The steeped grain was milled and then centrifuged to separate the germ and hulls from the cornstock. The cornstock was screened and centrifuged to produce starch. The germ and hulls were dried and aspirated to remove the hulls. The germ was conditioned to 12% moisture, heated to 88–104 ºC, flaked and then expelled to produce crude oil and presscake. The presscake was extracted with hexane at 50–60 ºC. Crude oil was recovered from the miscella by heating to 73–90 ºC. Refined oil was produced by adding sodium hydroxide and separating the soapstock.

Table 128 Azoxystrobin residues in maize grain and processed fractions in wet and dry milling

Processed Fractions	Azoxystrobin residues (mg/kg)	Processing factor	Reference
Wet milling:			Bussey and Aston 1999 RR 99-056B
Grain	0.11		
Refined oil	0.67	6.1	
Starch	< 0.01	< 0.09	
Dry milling:			Bussey and Aston 1999 RR 99-056B
Grain	0.11		
Meal	0.06	0.55	
Grits	0.03	0.27	
Flour	0.08	0.73	
Refined oil	0.07	0.64	

Processing of rice

A processing study was conducted on rice in the USA during 1995 (Sapiets and Roper, 1996; RJ2205B). Azoxystrobin was applied twice as a WG formulation at the rate of 0.22 kg ai/ha and once at full heading at 0.34 kg ai/ha. Samples of grain were taken 28 days after the final application.

Rough rice samples were dried in an oven between 43–60 ºC. The final moisture content after drying was 13%. After aspiration and screening, foreign particles were removed from the rice. The sample was passed through a dehuller to remove and separate the hull from brown rice. A sample of rice hulls was taken and frozen for analysis. The brown rice was then decorticated in an abrasion mill and passed through a screen to separate white milled rice (polished), which remained on top of the screen, from the bran, which passed through the screen. The process was repeated until the total amount of bran was 11–17% of the starting brown rice weight. Samples of polished rice and bran were placed in containers until analysis in about 11 months.

Table 129 Azoxystrobin residues in rice grain and processed fractions

Processed Fractions	Azoxystrobin residues (mg/kg)	Processing factor	Reference
Rice grain	0.33		Sapiets and Roper 1996 RJ2205B
Polished rice	0.03	0.09	
Hulls	1.6	4.8	
Bran	0.39	1.2	

Processing of wheat

Two processing studies were conducted on wheat grain in Germany, one in 1995 and the other in 1996 (Sapiets, *et al*, 1996; RJ2065B; Clarke, *et al*., 1997 RJ2297B). In the 1995 study, wheat grain samples were taken at harvest from a field treated with three applications of a 250 SC formulation at the rate of 0.25 kg ai/ha. In the 1996 study, wheat grain samples were taken at harvest from a field treated with three applications of azoxystrobin at the rate of 0.50 g ai/ha.

In both studies the grain sample was cleaned by sieving and blowing and the cleaned grain tempered to a moisture content of 16%. The grain was broken three times in a roller mill to produce

wholemeal flour. A second sample was ground and separated into bran (> 710 micron particle size), shorts, and flour using a sieve. Samples of each fraction were collected and frozen for analysis. Storage period from processing to analysis was about five months.

In the 1995 trial, azoxystrobin residues in the wheat grain sample before processing was at the LOQ of 0.01 mg/kg. No measurable residues were found in most fractions and processing factors could not be calculated. Results from the 1996 trial conducted at 200% GAP rate are summarized in Table 130.

Table 130 Azoxystrobin residues in wheat grain and processed fractions

Processed Fractions	Residues mg/kg	Processing factor	Reference
Grain	0.08		Clarke and Chamier 1997 RJ2297B
Wholemeal flour	0.02	0.25	
Bran	0.03	0.38	
Shorts	0.01	0.13	
Low grade flour	0.02	0.25	
Patent flour	0.02	0.25	
Wholemeal bread	< 0.01	< 0.13	
Flour bread	0.01	0.13	

Processing of cottonseed

A processing study on cottonseed was carried out in the US during 1997 (Bussey, *et al*., 1998; RR 98-058B). Cottonseed samples were obtained from a trial in which a single in-furrow application of azoxystrobin was made at 500% GAP rate. The seed was processed to produce hulls, meal, and refined oil, following commercial practices.

No sample of undelinted seed, hulls, meal or refined oil contained residues of azoxystrobin at or above the limit of quantitation of 0.01 mg/kg.

Processing of soya beans

A processing study was carried out on soya beans in the USA during 1998 (Bussey and Lipton, 1999; RR 99-051B). Samples of soya beans harvested 12 days after the final application of a treatment regime consisting of six applications of azoxystrobin at 500% GAP rate (1.4 kg ai/ha) were processed to hulls, meal, and refined oil, following commercial practices.

Soya beans were dried at 54–71 ºC to a moisture content of 7–10%. After removal of foreign particles, the whole soybeans were milled to crack the hull and liberate the kernel. Hulls were separated by aspiration. The kernels were heated to 71–79 °C, flaked, steam expanded and dried at 54–71 °C. The resulting collets were extracted with hexane at 50–54 °C three times, dried, and ground to meal. Crude oil was recovered from the miscella by heating to 73–90 °C and refined oil produced by adding sodium hydroxide followed by separating and removing the soapstock. All processed fractions were frozen for analysis. Samples were stored frozen for 250–260 days between sampling and extraction. The results are summarized in Table 132.

Table 131 Azoxystrobin residues in soya beans and processed fractions

Processed Fractions	Azoxystrobin residues mg/kg	Processing factor	Reference
Soya bean seed	0.44		Bussey and Lipton 1999 RR 99-051B
Hulls	0.96, 1.0 (0.98)	2.2	
Meal	0.04, 0.04 (0.04)	0.09	
Refined oil	0.33, 0.35 (0.34)	0.77	

Processing of sunflower

A processing study on sunflower seeds was carried out in the US during 2000 (Judy, et al., 2001; RR 00-059B). Sunflower seeds were obtained from a field trial receiving treatments of azoxystrobin at 500% the annual GAP rate (2.5 kg ai/ha). Samples of sunflower seeds were collected at 28–30 days after the final application.

Sunflower seeds were dried at 55–71 °C to a moisture content of 7–10%. After aspiration and screening, large and small foreign particles were removed. The sunflower seeds were then fed into a disc mill to crack the hull and liberate the kernels. The hulls were separated from the kernels by further aspiration and screening. The kernels were conditioned to 12% moisture, heated to 88–105 °C, and pressed in an expeller to liberate a majority of the crude oil. The presscake was submerged in hexane at 49–60 °C and the resulting miscella further extracted with hexane to obtain crude oil. The crude oil was then heated to 75–90 °C to remove the hexane. Crude oil from the expeller and solvent extraction were combined and refined. Samples of sunflower seeds and the processed fractions were stored frozen until analysis. The results are summarized in Table 132.

Table 132 Azoxystrobin residues in sunflower and processed fractions

Processed Fractions	Azoxystrobin residues (mg/kg)	Processing factor	Reference
Sunflower seeds	0.14, 0.11 (0.13)		Judy, *et al.* 2001 RR 00-059B
Meal	< 0.01, < 0.01 (< 0.01)	< 0.08	
Oil, refined	0.02, 0.02 (0.02)	0.15	

Processing of peanuts

A processing study on peanuts was carried out in the USA in 1994 (Sapiets and Roper, 1996; RJ1980B). Samples of mature whole peanuts harvested from a field trial, in which azoxystrobin was applied twice at a rate of 2.5 kg ai/ha (550% the US GAP rate), were processed to meal and oil, following commercial practices.

Samples were shelled in a mechanical sheller to remove the hulls from the nutmeats (kernels). The resulting kernels were conditioned to 12% moisture, heated to 93–104 ºC and pressed in an expeller to liberate part of the crude oil. The resulting presscake was flaked and extracted with heated hexane to remove remaining crude oil. The crude oil from the expeller and the solvent extraction were combined and heated to 20–24 ºC and sodium hydroxide was added. The mixture was heated to a final temperature of 63–67 ºC and allowed to stand for 12 hours. The refined oil was decanted from the sediment in the bottom of the container. Samples of each processed fraction were frozen until analysis in about 13 months from the time of sampling. The results are summarized in Table 133.

Table 133 Azoxystrobin residues in peanuts and processed fractions

Processed Fractions	Azoxystrobin residues (mg/kg)	Processing factor	Reference
Nutmeat	0.01		Sapiets and Roper 1996 RJ1980B
Meal	0.01	1.0	
Crude oil	0.04	4.0	
Refined oil	0.03	3.0	

RESIDUES IN ANIMAL COMMODITIES

Farm animal feeding studies

The Meeting received information on lactating dairy cow and laying hen feeding studies.

Lactating dairy cows.

A feeding study was carried out in the United Kingdom between 1994 and 1995 (Sapiets and Ryan, 1995; RJ1878B) on five groups of three Frisian cows that were fed 0, 5, 25, 75 and 250 mg azoxystrobin/kg diet for up to 30 consecutive days. The doses were administered in corn oil twice daily at milking. Milk samples were taken twice a day and the daily production bulked into one single sample per cow. Milk samples were analysed for azoxystrobin on Days 1, 3, 5, 7, 12, 14, 17, 21, 16, and 30 after start of dosing. Samples of milk collected on Days 21–23 were processed into cream and skimmed milk. Average fat contents in the whole milk and cream were 3.7% and 55%, respectively. At the end of the treatment period, between Days 29 and 31, the cows were sacrificed and samples of muscle (meat), liver, kidney and fat were taken and analysed for residues of azoxystrobin. Residues of azoxystrobin were determined in the tissues and milk by method RAM 255, which had previously been validated with an LOQ of 0.01 mg/kg for animal tissue samples and 0.001 mg/kg for milk.

No effects upon milk yields or general health of the animals were observed throughout the study period. Table 134 summarizes the residues of azoxystrobin obtained in milk fed with diet containing azoxystrobin. Table 135 gives azoxystrobin residues in cream and skimmed milk. Table 136 provides azoxystrobin residues in tissues. No residues above the LOQ were found in the meat (muscle) from any azoxystrobin dose.

Table 134 Azoxystrobin residues (in mg/kg) in milk of cows fed with diet containing azoxystrobin for 30 consecutive days (mean and highest residues from three cows per each dose)

Days of dosing	Dose rate							
	5 mg/kg		25 mg/kg		75 mg/kg		250 mg/kg	
	Mean	Highest	Mean	Highest	Mean	Highest	Mean	Highest
1	< 0.001	< 0.001	0.004	0.006	0.001	0.001	0.003	0.004
3	0.001	0.001	0.002	0.003	0.003	0.004	0.006	0.009
5	< 0.001	< 0.001	0.003	0.003	0.002	0.003	0.005	0.006
7	0.002	0.003	0.002	0.002	0.002	0.002	0.005	0.007
12	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.005
14	NA	NA	0.003	0.003	0.001	0.002	0.005	0.006
17	< 0.001	< 0.001	0.001	0.001	0.002	0.002	0.004	0.007
21	0.003	0.003	0.001	0.001	0.001	0.002	0.004	0.005
26	0.002	0.003	0.002	0.003	0.002	0.002	0.003	0.005
30	0.002	0.003	0.003	0.003	0.001	0.002	0.003	0.003

NA=not analysis done

Table 135 Azoxystrobin residues (in mg/kg) in skimmed milk and cream obtained from milk collected on Days 21–23

Azoxystrobin dose (mg/kg)	Skimmed milk (mg/kg)	Cream (mg/kg)
5	< 0.001, < 0.001, < 0.001 (< 0.001)	< 0.01, < 0.01, < 0.01 (< 0.01)
25	< 0.001, < 0.001, < 0.001 (< 0.001)	< 0.01, < 0.01, < 0.01 (< 0.01)
75	0.001, < 0.001, < 0.001 (0.001)	0.02, 0.01, 0.01 (0.01)
250	0.001, 0.002, 0.003 (0.002)	0.04, 0.03, 0.02 (0.03)

Table 136 Azoxystrobin residues (in mg/kg) in tissues of cows fed with diet containing azoxystrobin for 30 consecutive days (mean and highest residues from three cows per each dose)

Dose mg/kg	Tissue					
	Adductor muscle (mg/kg)	Pectoral muscle (mg/kg)	Liver (mg/kg)	Kidney (mg/kg)	Peritoneal fat (mg/kg)	Subcutaneous fat (mg/kg)

	highest	mean	highest	mean	highest	mean	highest	mean	highest	mean	highest	mean
5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
25	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
75	< 0.01	< 0.01	< 0.01	< 0.01	0.05	0.03	0.01	0.01	0.03	0.02	0.02	0.02
250	< 0.01	< 0.01	< 0.01	< 0.01	0.07	0.05	0.02	0.02	0.03	0.02	0.02	0.01

Laying hens

A feeding study was conducted in the USA in 1996 (Sapiets and Farrelly, 1997; RJ2349B) on four groups of 12 hens (Gallus gallus domesticus) fed for 28 consecutive days on standard layer ration, which had been fortified with azoxystrobin. The birds were divided into three pens holding four birds each. Each group was fed with a nominal dose rate of 6, 18, or 60 mg azoxystrobin/kg diet. An additional 12 birds were fed with untreated ration over the same period as controls.

Eggs were collected twice daily and the total daily production for each group bulked. On Day 21, the eggs were separated into yolk and egg white. At the end of the treatment period, and within seven hours of withdrawal of the test diets, the birds were slaughtered. Samples of liver, fat, muscle (breast and thigh meat) were taken as soon as possible after slaughter and deep frozen prior to analysis. Three samples were collected per treatment group. All samples were maintained frozen for three months prior to analysis. Samples of eggs and tissues were analysed for azoxystrobin residues by method RAM 255, which had previously been validated with an LOQ of 0.01 mg/kg for all matrices.

Tables 137 and 138 give results for the eggs and tissues, respectively, for the highest feeding rate of 60 mg/kg. No measurable residues of azoxystrobin above the LOQ of the method (0.01 mg/kg) were found in any sample from the highest feeding rate of 60 mg/kg. Therefore, no further analyses were carried out on the samples from the lower dose rate groups.

Table 137 Azoxystrobin residues (in mg/kg) in eggs of hens fed with diet containing azoxystrobin at 60 mg/kg for 28 consecutive days

Sampling interval (days)	Control Group	Group 4 receiving 60 mg/kg dose rate		
		Replicate 1	Replicate 2	Replicate 3
1	< 0.01	< 0.01	< 0.01	< 0.01
3	–	< 0.01	< 0.01	< 0.01
7	–	< 0.01	< 0.01	< 0.01
10	–	< 0.01	< 0.01	< 0.01
14	< 0.01	< 0.01	< 0.01	< 0.01
18	< 0.01	< 0.01	< 0.01	< 0.01
25	< 0.01	< 0.01	< 0.01	< 0.01
28	< 0.01	< 0.01	< 0.01	< 0.01
21/ Egg Yolk	–	< 0.01	< 0.01	< 0.01
21/ Egg White	< 0.01	< 0.01	< 0.01	< 0.01

Table 138 Azoxystrobin residues (in mg/kg) in tissues of hens fed with diet containing azoxystrobin at 60 mg/kg for 28 consecutive days

Tissue	Control Group			Group 4 receiving 60 mg/kg dose rate		
	Replicate 1	Replicate 2	Replicate 3	Replicate 1	Replicate 2	Replicate 3
Meat	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Liver	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fat	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

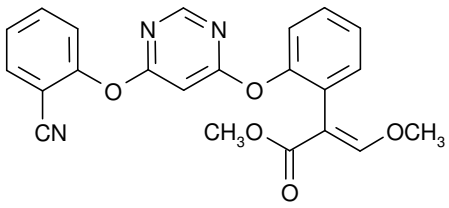
No information was received on residues of azoxystrobin in food in commerce or at consumption.

APPRAISAL

Azoxystrobin is a broad-spectrum fungicide belonging to the class of methoxyacrylates, which are synthetic analogues from the naturally-occurring strobilurin fungi. It exerts its fungicidal activity by inhibiting mitochondrial respiration in fungi. At the 39th Session[2] of the CCPR, azoxystrobin was scheduled for the evaluation as a new compound by the 2008 JMPR.

Chemical name

ISO common name:	Azoxystrobin
IUPAC:	Methyl (*E*)-2-{2 [6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate
CA:	Methyl(*E*)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxymethylene)benzeneacetate



Animal metabolism

The Meeting received results of animal metabolism studies in lactating goats and laying hens.

Lactating goats were dosed twice daily at each milking with either cyanophenyl-, pyrimidinyl, or phenylacrylate-[^{14}C]labelled azoxystrobin in gelatine capsules at a nominal rate of 25 ppm in the diet (on a dry weight basis) for seven consecutive days, corresponding to a daily dose of approximately 1 mg/kg bw. The actual dose rate was equivalent to 23–33 mg/kg in the diet. The majority (90–93%) of the administered radiolabelled doses were recovered. The primary route of excretion was via the faeces (62–72% of the administered doses). Excretion via the urine accounted for a further 18–24% of the administered doses, resulting in total of 83–92% of the administered doses being excreted in faeces and urine. The TRR in milk, muscle and fat were very low (0.004–0.025 mg/kg of azoxystrobin equivalents), corresponding to < 0.01% of the administered doses. Characterization of these radioactive residues by fractionation showed that they were unlikely to be attributed to any individual compound at a significant level. Radioactivity in milk reached a plateau of only 0.01 mg/L after 3–4 days of dosing.

In tissues and organs, most of the radioactivity was recovered in the liver (0.58–1.2 mg/kg) and kidney (0.18–0.25 mg/kg), corresponding to 0.2–0.4% and 0.06–0.08%, respectively, of the administered doses, reflecting the role of these organs in metabolism and excretion. In goat kidney, the major metabolites included 2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenylacetic acid (0.01–0.05 mg/kg, 6.9–20% TRR), a glucuronide conjugate of a phenylacrylate ring hydroxy-derivative of azoxystrobin (0.02–0.03 mg/kg, 8.2–16% TRR), and *(E)*-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid (0.005–0.02 mg/kg and 2.0–11% TRR). These metabolites

[2] Codex Alimentarius Commission. *Report of the 40th Session of the Codex Committee on Pesticides Residues, 14–19 April 2008, Hangzhou, China*, (ALINORM 08/31/24)

were also present in goat liver but not as major metabolites (only 0.2–0.9, 0.5–1.9, and 0.7–1.9% TRR, respectively). The major metabolite detected in liver of goats dosed with [cyanophenyl-^{14}C] labelled azoxystrobin was ring hydroxyl-derivative of S-(2-cyanophenyl)cysteine (compound L4: 0.35 mg/kg and 29% TRR), whereas 4-(2-cyanophenoxy)-6-hydroxypyrimidine was the major metabolite in liver of goats dosed with [pyrimidinyl-^{14}C] labelled azoxystrobin (0.13 mg/kg and 20% TRR). Compound L4 was not detected in kidney, and 4-(2-cyanophenoxy)-6-hydroxypyrimidine accounted for only 5.0% TRR in kidney of goats dosed with [pyrimidinyl-^{14}C] labelled azoxystrobin. Azoxystrobin parent was present at low levels in both the kidney (0.002–0.008 mg/kg and 0.8 to 2.0% TRR) and the liver 0.007–0.02 mg/kg and 0.6–1.8% TRR). In general, there was no significant difference in metabolism observed using the three different radiolabels.

Laying hens were dosed once daily with either cyanophenyl-, pyrimidinyl-, or phenylacrylate-[^{14}C] labelled azoxystrobin in gelatine capsules at a nominal rate of 1.5 mg/day for ten consecutive days, corresponding to a daily dose of approximately 0.75 mg/kg bw. The dose was equivalent to an intake of approximately 11–12 ppm in the diet.

The recovery of the administered radiolabelled dose was 93–98%. The majority of the administered dose was excreted in faeces (91–97%). The cage washings accounted for no more than 2.0% of the administered dose. Radioactive residues in tissues and eggs accounted for ≤ 0.2% of the dose. Residues in muscle, egg white, skin with underlying fat, and peritoneal fat were in the range of 0.004–0.039 mg/kg. The highest radioactive residues were in egg yolk (0.040–0.14 mg/kg) and liver (0.082–0.11 mg/kg), both of these representing ≤ 0.1% of the administered dose. The fractionation of these residues showed that no single organosoluble fraction exceeded < 0.01 mg/kg and aqueous or unextractable fractions represented < 0.05 mg/kg.

Residues in egg whites reached a plateau of only 0.008–0.011 mg/kg after 3–4 days of dosing. In egg yolks, the residues plateaued at 0.040–0.14 mg/kg after 6–8 days of the dosing. The Meeting noted that it typically takes up to ten days for an egg to form, therefore the egg yolk values can be used as representative of what is happening in the whole egg.

Azoxystrobin (< 0.001–0.006 mg/kg, 0.3–12% TRR) and 4-(2-cyanophenoxy)-6-hydroxypyrimidine (0.002–0.004 mg/kg of azoxystrobin equivalents and 1.8–8.4% TRR), were identified in egg yolk. A significant portion of the radioactivity (0.018 mg/kg and 15% TRR) in egg yolk from the hens dosed with [pyrimidinyl-^{14}C]azoxystrobin was due to the breakdown of azoxystrobin into small components, which were then incorporated through biosynthetic pathways into fatty acids.

Based on the results of the submitted studies, the Meeting concluded that, in goats and hens, azoxystrobin was rapidly metabolized and excreted in faeces and urine, with minimal retention of the parent and its metabolites in the tissues.

Plant metabolism

The Meeting received information on azoxystrobin metabolism, studied in wheat, grapes, peanuts, rice, and cotton.

Wheat was treated with radiolabelled azoxystrobin (labelled separately in each of the three rings) formulated as a suspension concentrate (250 g ai/L) and applied as a foliar spray twice (at BBCH 30–31 and 59–61) at a nominal rate of 0.5 kg ai/ha. The treated plants were harvested either as forage (a PHI of 13 days) or mature crop (a PHI of 61–62 days). The metabolic profile of azoxystrobin in wheat was very complex with at least 23 metabolites detected. Residues were mainly in the forage (TRR of 1.0–2.8 mg/kg) and straw (TRR of 3.1–9.4 mg/kg). The total radioactive residues in the grain were low (0.075–0.077 mg/kg).

In wheat grain, the only significant residue was the parent, azoxystrobin, (17–22% TRR and 0.013–0.017 mg/kg). No other discrete metabolite (12 compounds identified) was present at greater than 3.3% TRR (0.002 mg/kg). Naturally incorporated glucose comprised 9.7–21% TRR.

In the wheat straw and forage, 14 and 12 metabolites were identified, respectively. The major residue was azoxystrobin, representing 22–43% TRR (0.67–4.1 mg/kg) and 55–65% TRR (0.56–1.8 mg/kg) in the straw and forage, respectively.

Other significant components included:

4-(2-cyanophenoxy)-6-hydroxypyrimidine (a product of the cleavage of the ether linkage between the phenyacrylate ring and the pyrimidinyl ring), for which sum of free, conjugated and bound forms accounted for 8.2–10% TRR and 3.2–3.7% TRR in the straw and forage, respectively

the *Z*-isomer of azoxystrobin (2.1–3.5% TRR in straw, 1.9–2.9% TRR in forage), which is the photo-isomerisation product of azoxystrobin

(*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid (3.0–3.4% TRR in straw, 0.7–0.8% in forage), which can be formed from azoxystrobin either by hydrolysis of the ester group or by oxidative de-alkylation.

The Meeting noted that the metabolic profile of the extractable residue of azoxystrobin in wheat was essentially the same in each analysed sample and very similar in each radiolabel, with the parent as the major residue accounting for 19–26%, 24–47%, and 59–68% of the extractable residue in grain, straw, and forage, respectively.

In an additional study, winter wheat was treated with [pyrimidinyl-^{14}C]azoxystrobin applied once as a 250 SC formulation at 250 g ai/ha as a late season treatment at BBCH 71 (a PHI of 28 days). The total radioactive residues in grain and straw were 0.066 and 2.5 mg/kg, respectively. The only relevant radioactive residue was the parent, azoxystrobin, which accounted for 31% TRR (0.020 mg/kg) in grain and 51% TRR (1.3 mg/kg) in straw. Other significant metabolites, including 4-(2-cyanophenoxy)-6-hydroxypyrimidine or the *Z*-isomer of azoxystrobin, did not account for more than 3.4% TRR each. The Meeting noted that the results of this study were consistent with those from the previous wheat metabolism study. In both studies, azoxystrobin was the major component of the residue in grain and straw, representing 44% and 60% of the extractable residue, respectively.

Grapes were treated with radiolabelled azoxystrobin (labelled separately in each of the three rings), which was applied as a 250 SC formulation to three grape vines (one vine for each radiolabel) as a foliar spray four times with application rates of 0.25, 1.0, 1.0, and 0.25 kg ai/ha. Grapes and leaves were harvested 21 days after the final application. The TRR in grapes were 0.38–1.4 mg/kg of azoxystrobin equivalents. The major residue for each radiolabel was the parent, azoxystrobin (35–65% TRR and 0.13–0.92 mg/kg). A total of nine metabolites were identified and the most significant were 2-hydroxybenzonitrile (5.7% TRR), 4-(2-cyanophenoxy)-6-hydroxypyrimidine (2.6–5.2% TRR), the *Z*-isomer of azoxystrobin (1.9–4.0% TRR), and methyl 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-glycolate (2.5–3.9% TRR). Incorporation of radioactivity into naturally occurring sugars (glucose, fructose, and sucrose) indicated mineralization of [^{14}C]azoxystrobin in soil, with subsequent assimilation of $^{14}CO_2$ and the formation of ^{14}C-sugars via photosynthesis.

Peanuts were treated with radiolabelled azoxystrobin (labelled separately in each of the three rings), which was formulated as a 250 g ai/L suspension concentrate and applied three times as a foliar spray to peanut vines at 0.85, 0.85, and 0.3 kg ai/ha. Ten days after the last application, a portion of the vines was stored fresh and the remaining vines and pods (nut and hull intact) were dried. The radioactive residues were mainly in the hay (dried vine containing 39–47 mg/kg of azoxystrobin equivalent) and vine (16–21 mg/kg). Nuts and hulls contained only 0.24–0.65 mg/kg and 0.67–0.90 mg/kg, respectively. The most significant residues identified in the nutmeat were the fatty acids, oleic and linoleic, accounting for 28–32% TRR (0.074–0.21 mg/kg) and 11–16% (0.27–0.11 mg/kg), respectively. Natural incorporation of radioactivity into sugars sucrose (1.7–5.6% TRR), glucose (1.5–1.9% TRR), and fructose (1.4–2.2% TRR) indicated mineralization of [^{14}C]azoxystrobin in soil with subsequent assimilation of $^{14}CO_2$. Parent azoxystrobin was not detected in the nutmeat and no individual metabolite was present at a level greater than 1.0% TRR**.** In hay and hulls, the major component of the radioactive residue was the parent, azoxystrobin, accounting for 33–44% TRR (13–

20 mg/kg) and 13–14% TRR (0.088–0.11 mg/kg), respectively. A total of 10 and 11 metabolites were identified in hay and hull, respectively (residues in the vine were qualitatively similar to those in the hay), the most significant of which were 4-(2-cyanophenoxy)-6-hydroxypyrimidine (3.9% TRR in hay and 2.5–2.6% TRR in hulls) and its glucose conjugate (2.9–5.6% TRR in hay and 1.2-1.9% TRR in hulls).

Rice was treated with radiolabelled azoxystrobin (labelled separately in each of the three rings) in two separate experiments, one with a single foliar spray and the other with two granular paddy applications. For the foliar treatment, azoxystrobin was applied formulated as a suspension concentrate just after heading, at rates equivalent to a total field application of 0.36–0.55 kg ai/ha. For the paddy application, the compound was formulated as a granular product and applied twice to the paddy water to give a total seasonal application rate of 1.73–1.92 kg ai/ha. Crops were harvested at maturity after a PHI of 75–95 days for the foliar-treated plants and a PHI of 95–98 days after the second application for the granular treated rice plants.

The TRR (expressed as azoxystrobin) were 0.32–0.74 mg/kg and 5.7–11 mg/kg in grain and straw, respectively. In rice grain, the only significant residues from the granular application were radiolabelled sugars (43–58% TRR) and the parent compound (3.4–5.3% TRR). Similarly, the foliar application resulted mainly in the residues of the parent (36–72% TRR) and radiolabelled sugars (4.9–17% TRR). In rice straw, the major components from the granular application were the parent (3.3–5.6% TRR), isomers of methyl-2-{2-[6-(2-cyano-4-hydroxyphenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy acrylate (5.1–8.1%TRR), and (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid (3.6–6.7% TRR). In foliar application, the parent, azoxystrobin, was the single most abundant component (38–46% TRR), followed by 4-(2-cyanophenoxy)-6-hydroxypyrimidine (5.2–8.5% TRR). Similarly to rice grain, a portion of the radioactivity (up to 3.9% TRR) was identified as radiolabelled sugars.

Cotton grown in the USA was treated with [pyrimidinyl-^{14}C]azoxystrobin formulated as a suspension concentrate and applied at planting, as an in-furrow application, at a rate of 18 g ai/km (0.19 oz ai/1000 ft row), which was close to the US GAP for in-furrow application to cotton (19 g ai/km). The cotton was harvested both immature (forage) and mature (separated into seed, lint, and gin trash). Characterization of the residues was not carried out in seed, lint, and gin trash, in which the TRR were < 0.01 mg/kg. The TRR in forage was 0.085 mg/kg. The most significant residue in the forage was the parent, representing 15% TRR (0.013 mg/kg). At least eight unknowns were detected; not one representing > 0.01 mg/kg of parent equivalent. None of the unknowns co-chromatographed with any of the applied reference substances.

Based on the results of the submitted studies on wheat, grapes, peanut and cotton, the Meeting concluded that qualitatively similar metabolism occurred among these crops, with the parent, azoxystrobin, being the major component of the residue. In peanut meat, fatty acids (oleic and linoleic) accounted for most of the TRR. In cotton, no significant residues were detected in cottonseed after the in-furrow application at planting.

The Meeting noted that, in most of the studies, a significant portion of the radioactivity was identified as radiolabelled natural products such as sugars, starch, fatty acids, and amino acids. The presence of radioactivity in these natural products is believed to result from the mineralization of azoxystrobin in soil and subsequent incorporation of $^{14}CO_2$ via photosynthesis.

Environmental fate

The Meeting received information on aerobic and anaerobic degradation of azoxystrobin in soil; photolysis on soil surface; mobility in soil; field dissipation studies and azoxystrobin residues in rotational crops.

The aerobic and anaerobic degradation of radiolabelled azoxystrobin was studied in the dark at 20 °C in three soils (silt loam, sandy clay loam, and sandy loam) incubated for 120 days and one soil (sandy loam) incubated for 360 days.

Under aerobic conditions, azoxystrobin degraded with DT_{50} values between 56 and 279 days, depending on the amount of microbial biomass in this soil. No significant degradation was observed in sterile treatments, suggesting that the aerobic degradation was due to microbial activity. The major residue was azoxystrobin (31–55% and 33% of the applied radioactivity after 120 and 360 days, respectively). The only significant metabolite was (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid, accounting for 10–15% and 18% of the radioactivity after 120 and 360 days, respectively.

Under anaerobic conditions, the degradation was more rapid with DT_{50} of 49–181 days. Azoxystrobin accounted for 19–21% and 28% of the applied radioactivity after 120 and 360 days of incubation, respectively. (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid represented 57–59% and 49% of the radioactivity after 120 and 360 days, respectively.

Mineralization to CO_2 was significant with up to 27% detected after 120 days under aerobic conditions (only up to 5% under anaerobic conditions). The acid metabolite and other identified metabolites were also finally mineralized into CO_2.

Photodegradation of radiolabelled azoxystrobin was studied on the surface of sandy loam soil irradiated under conditions equivalent of up to 30 days Florida summer sunlight. Azoxystrobin underwent rapid degradation with a mean DT_{50} of 11 days Florida summer sunlight, which is equivalent to 11.5 days summer sunlight at 50 °North. A total of nine photolysis products were identified, of which the Z-isomer of azoxystrobin, 2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]benzoic acid, and 4-(2-cyanophenoxy)-6-hydroxypyrimidine accounted for up to 9%, 7.5%, and 5.7% of applied radioactivity, respectively. The only significant photodegradation product was $^{14}CO_2$, reaching up to 29% of the applied radioactivity.

The Meeting concluded that both photolytic and microbial degradation are important routes of degradation under field conditions, with both routes ultimately leading to formation of CO_2.

Mobility in soil was evaluated through adsorption/desorption and leaching studies, showing low to medium potential mobility of azoxystrobin in the tested soils.

Field dissipation studies on bare soil were performed in Northern and Southern Europe. The results showed a rapid degradation of azoxystrobin under field conditions (DT_{50} 3–39 days, DT_{90} 87–433 days). No measurable residues of azoxystrobin or its metabolites were determined below 10 cm. No measurable residues of the Z-isomer of azoxystrobin or (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid were determined in any samples from any trials, with the exception of detection of the acid metabolite in one trial in Northern Europe (0.03 mg/kg) in the 0–10 cm horizon. Residues of 4-(2-cyanophenoxy)-6-hydroxypyrimidine and 2-[6-(2-cyanophenoxy) pyrimidin-4-yloxy] benzoic acid ranged between < 0.01–0.03 and < 0.01–0.05 mg/kg, respectively, in the 0–10 cm horizon and declined to < 0.01 mg/kg by 28–195 days after application.

Water-sediment systems

The hydrolysis rate of [^{14}C]azoxystrobin was determined at 25 °C and 50 °C in buffered aqueous solutions at pH 5, 7 and 9 under sterile conditions in the dark for up to 31 days. At 25 °C, there was no significant hydrolysis (< 10%) at any pH. At 50 °C, there was no significant hydrolysis at pH 5 or 7. At 50 °C and pH 9, analysis showed significant hydrolysis (DT_{50}=12.56 days). The Meeting concluded that no significant hydrolysis of azoxystrobin is likely under realistic environmental conditions.

The aqueous photolysis of [^{14}C]azoxystrobin was studied at 25 °C in buffered aqueous solutions at pH 7 under sterile conditions over a period of approximately 30 days using an artificial light source. The half-life was calculated to be in the range of 11 and 17 days Florida summer sunlight (12–18 days summer sunlight at 50 °North). Azoxystrobin was the major component in all samples, accounting for up to 26% of the applied radioactivity at the final sampling interval. Only one photoproduct, the Z-isomer, was present at levels greater than 10% of the applied radioactivity during the study.

Degradation in the sediment/water systems was studied in two natural systems under laboratory conditions in the dark at 20 °C over 152 days. Throughout the incubation period, the majority of the radioactivity (44–75% of applied radioactivity) was found in the sediment layer. In water, azoxystrobin was rapidly dissipated with a half-life of less than seven days. After 152 days of incubation, the parent compound azoxystrobin represented 47–61% of the applied radioactivity in the water-sediment systems. (*E*)-2-{2-[6-(2-cyano-phenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-acrylic acid was the major metabolite, present at up to 20% of the applied activity 152 days after incubation, while up to 6% of the applied radioactivity had been mineralized to CO_2. Azoxystrobin reaching water would be quickly adsorbed onto sediment and subsequently degraded, thus unlikely to cause residues in crops.

Residues in Rotational Crops

The Meeting received results of three greenhouse confined rotation studies conducted in the USA. In each study, radiolabelled azoxystrobin (different radiolabel each time) was applied directly to sandy loam soil at 2.2 kg ai/ha, which corresponds to the maximum seasonal application rate for azoxystrobin in the USA (maximum of six applications of a single rate of 0.37 kg ai/ha or maximum of eight applications of a single rate of 0.28 kg ai/ha), thus simulates a worst case scenario. Rotational crops (radish, lettuce, and wheat) were planted 30, 200, and 365 days after the treatment. Radish and lettuce were harvested at maturity while wheat was harvested at an immature stage (forage) and at maturity (grain and straw).

The TRR in the soil declined on average from 0.74–1.0 mg/kg at treatment to 88, 56, and 13% at 30, 200, and 365 days after treatment, respectively. The metabolism of azoxystrobin in rotational crops was complex with a large number of conjugated metabolites formed (mostly glucose or amino acid conjugates of the corresponding primary crop metabolites). The residues declined significantly at longer plant back intervals. Radioactive residues in the 365-day crops were generally in concentrations below 0.01 mg/kg. As in the primary crops, parent azoxystrobin represented the major residue detected in all rotational crops (up to 17–44% TRR); with very low actual residue levels in the tested crops (< 0.01–0.08 mg/kg at 30 days and < 0.01–0.01 mg/kg at 200 days). In wheat forage and wheat straw at 30 days, TRRs were 0.15–0.34 and 1.4–1.9 mg/kg, respectively, which declined significantly at the longer plant back intervals of 200 days (to 0.02–0.05 and 0.06–0.12 mg/kg, respectively) and 365 days (to < 0.01 mg/kg). Azoxystrobin residues in wheat grain were < 0.01 mg/kg even in wheat planted 30 days after the treatment.

In the absence of field rotational studies, it was difficult to assess the uptake of rotational crops (such as cereals), from soil under realistic conditions. The Meeting noted that the greenhouse confined studies were conducted at an exaggerated application rate: the TRR in the soil declined rapidly, and the azoxystrobin residues resulting from direct applications on the rotational crops were significantly higher than those found (even at the shortest plantback interval of 30 days) in the confined rotational studies resulting from the uptake from the treated soil.

Methods of analysis

The Meeting received descriptions and validation data for analytical methods for azoxystrobin in samples of plant and animal origin.

The described methods are mostly based on extraction with an organic solvent (usually acetonitrile or acetone); followed by a partition step, gel permeation chromatography (GPC) clean-up, and often also a silica, C18, alumina or Florisil solid-phase extraction (SPE) clean-up. The determination step employs either capillary GC with nitrogen-phosphorus (GC-NPD) or mass spectrometric (GC-MS) detection or liquid chromatography with tandem MS detection (LC-MS/MS). The typical LOQ is 0.01 mg/kg for most plant and animal matrices, with mean recoveries typically ranging between 70–120%. Multiresidue methods, such as the German DFG S19, are available for azoxystrobin analysis in plant and animal matrices.

Adequate multi- and single-residue methods exist for both gathering data in supervised trials and other studies and for monitoring and enforcing azoxystrobin MRLs in samples of plant and animal origin.

Stability of pesticide residues in stored analytical samples

The Meeting received information on the stability of azoxystrobin in samples of plant and animal commodities freezer-stored at ≤ –18 °C. Fortified samples, typically at 0.1 mg/kg, of plant commodities (apples, orange oil, juice and pulp, peaches, grapes, wine, bananas, tomatoes, cucumbers, carrot root, lettuce leaf, oilseed rape, soya bean meal, corn grits, wheat straw, grain, and forage, peanuts, and pecans) were stored for up to 24 months. Fortified samples of processed commodities (peanut oil and meal, wheat bran and tomato juice and paste) were stored up to 12 months. Fortified samples of animal origin (beef muscle, liver, kidney, fat, milk and eggs) were stored up to ten months, which adequately covers the sample storage intervals in the livestock feeding studies.

No significant degradation of azoxystrobin was observed in the samples tested over the reported storage intervals. The uncorrected recoveries of azoxystrobin were > 70% during the storage intervals, except for one sample of orange pulp (56% recovery), for which the concurrent recovery was also low (69%).

Azoxystrobin is stable when stored frozen (≤ –18 °C) over the periods for which crop and animal tissue samples were stored, prior to the analysis in supervised trials, animal feeding and processing studies.

Residue definition

Azoxystrobin is extensively metabolized in animals and plants. Results of plant metabolism studies on wheat, rice, grapes, peanuts, and cottonseed indicate that azoxystrobin is rapidly metabolized and that portions of the molecule becomes associated with sugars and other natural plant constituents. The main residue remaining in the edible plant tissues at harvest is the parent compound, azoxystrobin. Although a number of metabolites were identified, all were at levels below 10% of the total recovered radioactive residue.

In ruminants (goats) and poultry (hen), azoxystrobin was rapidly metabolized with the majority of the administered dose excreted in the faeces and urine. The metabolism was quantitatively similar to rats. The total radioactive residues in goat milk, muscle, and fat were very low and characterization showed that the residues were unlikely to be attributed to any individual compound at a significant level. The residues were higher in kidney and liver, reflecting the role of these organs in metabolism and excretion. The major metabolites in the liver were not detected or found only at low levels in the kidney and vice versa. The parent, azoxystrobin, was present at low levels in both the kidney and liver. The hen metabolism showed very low transfer of radioactivity into tissues and eggs. The parent, azoxystrobin, was identified in the egg yolk (up to 12% TRR).

Based on the above, the Meeting agreed:

Definition of the residue in plant and animal commodities for estimation of dietary intake and for compliance with MRLs: *azoxystrobin.*

The log K_{ow} of azoxystrobin is 2.5 (at 20 °C, pH 7). In the cattle feeding study, azoxystrobin accumulated in cream when milk was processed to skimmed milk and cream (6.7 to 40-fold higher azoxystrobin concentration in cream *vs.* skimmed milk), corresponding to 5–7.5 concentration factor for cream *vs.* whole milk. Also, even at the highest dosing level of 250 ppm, no measurable azoxystrobin residues (< 0.01 mg/kg) were found in cattle muscle, whereas azoxystrobin residues of 0.01–0.03 mg/kg were determined in fat. The Meeting noted that azoxystrobin represents a borderline case of fat solubility and concluded that the azoxystrobin residue is fat-soluble for the purpose of the residue definition.

Results of supervised residue trials on crops

The Meeting received supervised trials data for azoxystrobin on citrus fruits (post-harvest and foliar treatments), stone fruits (cherry, peach and plum), berries and small fruit (blackberry, blueberry, cranberry, grapes, raspberry and strawberry), tropical fruits with inedible peel (banana, mango and papaya), bulb vegetables (bulb onion, spring onion and leeks), brassica vegetables (broccoli, Brussels sprouts, cabbage, cauliflower and kohlrabi), fruiting vegetables (cucumber, gherkin, melon, summer squash, pepper and tomato), lettuce, legume vegetables (beans and peas), pulses (soya beans), root and tuber vegetables (beetroot, carrot, chicory, potato, radish and sugar beet), stalk and stem vegetables (artichokes, asparagus, celery, witlof and chicory), cereal grains (barley, oat, rye, triticale, wheat, maize and rice), tree nuts (almonds, pecans and pistachios), oil seeds (cottonseed, peanuts and sunflower), herbs (basil, chives, parsley and mint), peanut hay, soya bean forage and hay, straw, fodder and forages of cereal grains (barley, oat, rye, triticale, wheat, maize and rice), sugar beet tops, dried herbs (basil, chives, parsley and hops), and almond hulls.

Citrus fruit

The Meeting received results from supervised trials with azoxystrobin used as post-harvest and foliar treatments on citrus fruits (grapefruit, orange, lemon, tangerine and mandarin) in the USA.

For the post-harvest treatment on citrus fruits, the GAP of the USA specifies a maximum of two treatments (for maximum decay control, once before storage and once after storage, just prior to marketing) that can be performed as a dip application with 0.12 kg ai/hL or a spray, drench, or flood application with 4 kg ai/ton fruit.

Ten trials were performed according to the GAP using two dip treatments (one with and one without a storage wax) at 0.12 kg ai/hL. Azoxystrobin residues in whole fruit were: 2.7 and 2.9 mg/kg for grapefruit, 2.1 and 2.2 mg/kg for orange, 2.6 and 4.2 mg/kg for tangerine, 3.4 and 6.2 mg/kg for mandarin, and 5.5 and 8.8 mg/kg for lemon. Three trials at the GAP using two spray treatments at 4 kg ai/ton fruit resulted in significantly lower azoxystrobin residues: 0.86 (grapefruit), 0.58 (orange) and 0.88 (lemon) mg/kg.

Eighteen other trials were performed at the GAP rate but only with a single application. Among these trials, the dip treatment with a storage wax resulted in the highest azoxystrobin residues (as compared to dip without wax or spray with or without wax), which were: 2.1 and 5.3 mg/kg for grapefruit, 1.6 and 4.0 mg/kg for orange, and 3.5 and 6.6 mg/kg for lemon.

In one post-harvest orange trial, involving a single dip without a storage wax, azoxystrobin residues in the whole fruit, pulp, and peel were analysed. Azoxystrobin residues were: 2.0 mg/kg in the whole fruit, 0.72 mg/kg in pulp, and 5.4 mg/kg in orange peel.

For the foliar treatment on citrus fruits, the GAP of the USA specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications at 7–21 day intervals) and a PHI of 0 days. Twenty-two trials were conducted at the GAP, with azoxystrobin residues in grapefruit (n = 6): 0.19, 0.20, 0.21, 0.25, 0.27, and 0.41 mg/kg; in orange (n = 11): 0.23, 0.26, 0.28, 0.30, 0.31, 0.32, 0.34, 0.37, 0.40, 0.41, and 0.53 mg/kg for orange; and for lemon (n = 5): 0.31, 0.52, 0.60, 0.65, and 0.74 mg/kg.

The Meeting noted that azoxystrobin residues from the foliar application were significantly lower as compared to the residues obtained in the post-harvest dip trials. The Meeting agreed to use the post-harvest dip results with one and two applications on the smaller citrus fruits (lemon, tangerine, and mandarin) to support a "citrus fruit" maximum residue level. Azoxystrobin residues in whole citrus fruit, in ranked order, were (n = 8): 2.6, 3.4, 3.5, 4.2, 5.5, 6.2, 6.6 and 8.8 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in whole citrus fruit of 15 mg/kg and an STMR value of 4.9 mg/kg.

Stone fruit

The Meeting received results from supervised trials with azoxystrobin used as a foliar treatment on stone fruits (cherry, peach, and plum) in the USA.

The GAP of the USA for stone fruit specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications at 7–14 day intervals) and a PHI of 0 days.

Seven trials on sweet cherry were conducted at the GAP rate with eight applications. Azoxystrobin residues in cherry, in ranked order, were (n = 7): 0.20, 0.42 (2), 0.45, 0.50, 0.98, and 1.0 mg/kg.

Fourteen trials on peach were conducted at the GAP rate with eight applications. Azoxystrobin residues in peach, in ranked order, were (n = 14): 0.28, 0.38, 0.41, 0.60, 0.64, 0.72 (2), 0.73, 0.74, 0.83, 0.84, 0.86, 0.89, 0.94, and 1.4 mg/kg.

Eight trials on plum were conducted at the GAP rate with eight applications. Azoxystrobin residues in plum, in ranked order, were (8): 0.02, 0.09, 0.24 (2), 0.25, 0.30, 0.37, and 0.42 mg/kg.

The Meeting agreed that the data on cherry, peach, and plum complying with the US GAP for stone fruit could be used to support a commodity group maximum residue level. Based on the residues obtained on peach, the Meeting estimated a maximum residue level for azoxystrobin in stone fruit of 2 mg/kg and an STMR value of 0.74 mg/kg.

Berries and other small fruits

The Meeting received results from supervised trials from the USA where azoxystrobin was used as a foliar treatment on berries and other small fruits, i.e., blackberry, blueberry, cranberry, raspberry, grape, and strawberry.

Blackberry, raspberry and blueberry

The GAP of the USA for cane berries (including blackberry and raspberry) specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications at 7–14 day intervals) and a PHI of 0 days. One trial on blackberry was at the GAP rate with eight applications. Azoxystrobin residue was 3.6 mg/kg. Two trials on raspberry were according to the GAP (six or seven applications). Azoxystrobin residues were 0.71 and 2.4 mg/kg.

The GAP of the USA for bush berries (including blueberries) specifies a rate of 0.28 kg ai/ha with a seasonal total of 0.84 kg ai/ha (three applications at 7–14 day intervals) and a PHI of 0 days. Seven trials on blueberries were conducted at the GAP rate with six applications. Azoxystrobin residues, in ranked order, were (n =7): 0.52, 0.79, 0.86, 0.95, 1.1 (2), and 1.4 mg/kg.

The Meeting decided to use the data on blackberry, raspberry, and blueberry to support a "Berries and other small fruits, except cranberry, grapes, and strawberry" commodity group maximum residue level. Azoxystrobin residues, in ranked order (n = 10): 0.52, 0.71, 0.79, 0.86, 0.95, 1.1 (2), 1.4, 2.4, and 3.6 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in Berries and other small fruits, except cranberry, grapes, and strawberry of 5 mg/kg and an STMR value of 1.0 mg/kg.

Cranberry

The GAP of the USA for cranberry specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications at 7–14 day intervals) and a PHI of three days. Four trials were conducted according to the GAP. Azoxystrobin residues, in ranked order, were: 0.15, 0.19, 0.26, and 0.31 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in cranberry of 0.5 mg/kg and an STMR value of 0.23 mg/kg.

Grapes

The GAP of the USA for grapes specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications at 10–14 day intervals) and a PHI of 14 days. Fifteen trials on grapes were conducted according to the GAP with a PHI of 13–14 days. Azoxystrobin residues in grapes, in ranked order, were (n = 15): 0.11, 0.16, 0.24, 0.30, 0.33, 0.47 (2), 0.53 (3), 0.60, 0.62, 0.73, 0.76, and 0.80 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in grapes of 2 mg/kg and an STMR value of 0.53 mg/kg.

Strawberry

The GAP of the USA for strawberry specifies a rate of 0.28 kg ai/ha with a maximum seasonal total of 1.1 kg ai/ha (four applications at 7–10 day intervals) and a PHI of 0 days. Seven trials were conducted at the GAP rate with 6–7 applications. Azoxystrobin residues in strawberry in ranked order were (n = 7): 0.26, 0.28, 0.65, 1.3 (2), 4.3, and 4.5 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in strawberry of 10 mg/kg and an STMR value of 1.3 mg/kg.

Tropical fruits- inedible peel

Bananas

The Meeting received results from supervised trials with azoxystrobin used as a foliar treatment on bananas in the USA and as a post-harvest treatment in Central America (Costa Rica, Guatemala, and Mexico). The post-harvest trials were carried out according to the GAP of the USA.

For the foliar treatment on bananas and plantains, the GAP of the USA specifies a rate of 0.15 kg ai/ha with a maximum seasonal total of 1.2 kg ai/ha (eight applications at 12–14 day intervals) and a PHI of 0 days. Six trials were conducted according to the GAP. Azoxystrobin residues in whole fruit from bagged bunches were (n = 6): 0.01, 0.02 (2), 0.05 (2), and 0.15 mg/kg. Azoxystrobin residues in whole fruit from unbagged bunches were (n = 6): 0.10, 0.11, 0.17, 0.18, and 0.26 (2) mg/kg. Azoxystrobin residues in banana pulp were < 0.01 (4) and 0.01 (2) mg/kg for bagged bananas and < 0.01 (3), 0.02 (2), and 0.03 mg/kg for unbagged bananas.

For the post-harvest treatment on bananas and plantains, the GAP of the USA specifies a maximum of one application made as a spray, dip, or paint using 0.04 kg ai/hL. Six post-harvest trials on banana were conducted according to the GAP. Azoxystrobin residues in the whole fruit, in ranked order, were (n = 6): 0.58, 0.71, 0.82, 0.85, 0.98, and 1.1 mg/kg. Azoxystrobin residues in the pulp, in ranked order, were (n = 6): < 0.02, 0.02, 0.03 (2), 0.05, and 0.07 mg/kg.

The Meeting noted that the post-harvest trials resulted in higher residues, thus considered only the post-harvest results for maximum residue level and STMR estimations. Also, the Meeting agreed to extrapolate the results from bananas to plantains (the same GAP as bananas).

The Meeting estimated a maximum residue level for azoxystrobin in banana and plantain (whole fruit) of 2 mg/kg. Based on the pulp data, the Meeting estimated an STMR value of 0.03 mg/kg for banana and plantain pulp.

Mango

The Meeting received results from supervised trials on mango in Brazil, South Africa, and the USA.

In Brazil azoxystrobin is approved for use on mangoes at a spray rate of 0.008 kg ai/hL (0.06 kg ai/ha), with a maximum of six applications and a PHI of 2 days. From six trials in Brazil, at the GAP rate with six or eight applications residues of azoxystrobin, in whole fruit, were (n = 6): 0.03, 0.06 (2), 0.07, 0.08, and 0.13 mg/kg.

The GAP of South Africa specifies an application rate of 0.01 kg ai/hL, a maximum of two applications and a PHI of 21 days. Four trials complied with the GAP of South Africa, azoxystrobin residues, in whole fruit (n = 4), were: 0.02, 0.03, and 0.06 (2) mg/kg. The residues in flesh were < 0.01 mg/kg even at 200% GAP or in cases where fruit was harvested within the PHI of 21 days. In

two trials at 100 and 200% of the GAP rate and a PHI of 0 days, azoxystrobin residues in flesh were 0.01 and 0.03 mg/kg and in whole fruit were 0.05 and 0.20 mg/kg, respectively, giving an average whole fruit/flesh residue concentration factor of 5.8.

The GAP of the USA (for tropical fruit) specifies a rate of 0.28 kg ai/ha with a maximum of six application (1.7 kg ai/ha seasonal total) and a PHI of 0 days. In three US trials, conducted according to the US GAP, residues of azoxystrobin in mango halves (stone removed) were: 0.09, 0.31, and 0.48 mg/kg. Using the stone/whole fruit weight factors of 0.10 and 0.09, based on the information provided in the South African trials for mango varieties Kent and Tommy Atkins, respectively, calculated residues of azoxystrobin in whole fruit were: (n = 3): 0.08, <u>0.28</u>, and 0.44 mg/kg.

Based on the results from the US trials, the Meeting estimated a maximum residue level for azoxystrobin in mango (whole fruit) of 0.7 mg/kg. Based on the whole fruit/flesh residue concentration factor of 5.8 and the median value in whole fruit of 0.28 mg/kg, the Meeting estimated an STMR value of 0.05 mg/kg for mango flesh.

Papaya

The Meeting received results from supervised trials with azoxystrobin used as a foliar treatment on papaya in Brazil and Malaysia.

The GAP of Brazil specifies a spray concentration 0.008 kg ai/hL (0.064 kg ai/ha), with a maximum of four applications and a PHI of 3 days. Four trials on papaya in Brazil involved six applications at 125% GAP rate. Azoxystrobin residues in the whole fruit were: 0.06, 0.09, 0.11, and 0.12 mg/kg. In two trials, papaya flesh was analysed, with azoxystrobin residues in flesh being 0.01 and 0.02 mg/kg at a PHI of three days. The whole fruit/flesh distribution data were also obtained for two trials at 250% GAP rate (PHIs of 0–14 days). The average whole fruit/flesh residue concentration factor was 5.8 (n = 18).

The GAP of Malaysia specifies a spray concentration 0.011 kg ai/hL (0.11 kg ai/ha), a maximum of two applications and a PHI of one day. Three trials on papaya in Malaysia were conducted according to the GAP. Azoxystrobin residues in the whole fruit were (n = 3): < 0.05 (2) and 0.15 mg/kg.

The Meeting decided to combine results obtained from supervised trials on papaya in Brazil and Malaysia for mutual support. Azoxystrobin residues in the whole fruit, in ranked order, were (n = 7): < 0.05 (2), 0.06, <u>0.09</u>, 0.11, 0.12 and 0.15 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in papaya (whole fruit) of 0.3 mg/kg. Based on the whole fruit/flesh residue concentration factor of 5.8 and the median value in whole fruit of 0.09 mg/kg, the Meeting estimated an STMR value of 0.02 mg/kg for papaya flesh.

Bulb vegetables

Leeks

The Meeting received results from supervised trials with azoxystrobin on leeks in France (Southern and Northern), Germany, Switzerland, and the UK.

The GAP of France specifies a rate of 0.25 kg ai/ha, with a maximum of three applications and a PHI of 50 days. The GAP of Germany specifies a rate of 0.25 kg ai/ha, a maximum of two applications and a PHI of 42 days. No trials were conducted according the GAP of France or Germany.

The GAP of the UK specifies a rate of 0.25 kg ai/ha, a maximum of four applications and a PHI of 21 days. The GAP of Switzerland specifies a rate of 0.25 kg ai/ha, a maximum of two applications (14-day interval), and a PHI of 14 days. The GAP of Italy specifies a rate of 0.25 kg ai/ha, a maximum of two applications (7–14 day interval) and a PHI of 15 days. Twelve trials in France (Southern and Northern), Germany, Switzerland, and UK were conducted according to the

GAP of Switzerland or Italy. Azoxystrobin residues found were (n = 12): 0.06, 0.07, 0.10, 0.11, 0.13, 0.14 (2), 0.17, 0.19, 0.34, 0.64, and 1.2 mg/kg.

Onion bulb, dry

The Meeting received results from supervised trials with azoxystrobin used on bulb onions in the USA. The GAP of the USA (for bulb vegetables) specifies a rate of 0.28 kg ai/ha, a maximum of 6 applications (total seasonal rate of 1.7 kg ai/ha) and a PHI of 0 days.

Eight trials were conducted according to the GAP. Azoxystrobin residues, in ranked order, were (n = 8): < 0.01, 0.07, 0.15, 0.21, 0.31, 0.36, 0.51, and 0.66 mg/kg.

Spring onion

The Meeting received results from supervised trials with azoxystrobin on spring onions in the USA. The GAP of the USA (for bulb vegetables) specifies a rate of 0.28 kg ai/ha, a maximum of 6 applications (total seasonal application rate of 1.7 kg ai/ha) and a PHI of 0 days.

Six trials were conducted according to the GAP with six applications. It was also decided to include one trial that involved 11 applications as the Meeting considered that the last application was more likely to contribute the majority to the residue of azoxystrobin. Also, the resulting residue of 3.3 mg/kg falls within the population of residues from the trials with six applications. Azoxystrobin residues, in ranked order, were (n = 7): 0.67, 1.3, 1.4, 2.2, 2.6, 2.7, 3.3, and 6.3 mg/kg.

The Meeting decided that the data on leeks, onion bulb and spring onion could be used to support a "bulb vegetables" commodity group maximum residue level. Based on the results on spring onions obtained according to the US GAP for bulb vegetables, the Meeting estimated a maximum residue level for azoxystrobin in bulb vegetables of 10 mg/kg and an STMR value of 2.2 mg/kg.

Brassica vegetables

Broccoli

The Meeting received results from supervised trials with azoxystrobin on broccoli in Europe (Germany, the Netherlands, and Spain), Canada and the USA.

In Europe, the GAPs of France, Germany, the Netherlands, and the UK specify a rate of 0.25 kg ai/ha, a maximum of two applications with a PHI of 14 days. Eight trials in Europe were conducted according to GAP. Azoxystrobin residues were (n = 8): < 0.01 (2), 0.01, 0.04 (3), 0.11, and 0.58 mg/kg.

The GAP of the USA (for brassica vegetables, head and stem subgroup) specifies a rate of 0.28 kg ai/ha with a maximum of 6 applications (total seasonal application rate of 1.7 kg ai/ha) and a PHI of 0 days. Two trials in Canada and two trials in the USA were conducted according to the US GAP. Azoxystrobin residues were (n = 4): 0.25, 0.93, 1.5, and 2.3 mg/kg.

The Meeting noted that azoxystrobin residues in broccoli obtained in the trials in the USA and Canada were significantly higher than those obtained in the European trials.

Brussels sprouts

The Meeting received results from supervised trials with azoxystrobin on Brussels sprouts in Europe (Austria, Germany, France, the Netherlands, Spain, and the UK).

In Europe, the GAPs of France, Germany, Italy, the Netherlands, and the UK for Brussels sprouts specifies a rate of 0.25 kg ai/ha, a maximum of two applications (8 to14-day interval) with a PHI of 14 days.

Twelve trials in Europe were conducted according to GAP with either two or four applications. Azoxystrobin residues, in ranked order were, were (n = 12): 0.03, 0.04 (3), 0.05 (3), 0.06, 0.08, 0.14, and 0.18 (2) mg/kg.

Cabbage, head

The Meeting received results from supervised trials with azoxystrobin on cabbage in Europe (Austria, Germany, Italy, the Netherlands, and Spain), Canada and the USA.

In Europe, the GAPs of France, Germany, Italy, the Netherlands, and the UK, for Brussels sprouts, specify a rate of 0.25 kg ai/ha, a maximum of two applications (8 to14-day interval), with a 14 day PHI. Twelve trials in Europe were conducted according to GAP with either two or four applications. Azoxystrobin residues, in ranked order were, were (n = 12): < 0.01 (7), 0.01 (2), 0.07, 0.09, and 0.18 mg/kg.

The GAP of the USA (for brassica vegetables, head and stem subgroup) specifies a maximum of six applications at 0.28 kg ai/ha (seasonal total rate of 1.7 kg ai/ha) with a PHI of 0 days. Two trials in Canada and two trials in the USA were conducted according to the US GAP. Azoxystrobin residues were (n = 4): 0.32, 0.90, 1.8 and 2.0 mg/kg.

The Meeting noted that azoxystrobin residues in cabbage obtained in the trials in the USA and Canada were significantly higher than those obtained in the European trials.

Cauliflower

The Meeting received results from supervised trials with azoxystrobin on cauliflower in Europe (Austria, Germany, Spain, and the UK).

The GAP of Germany specifies a maximum of two applications at 0.25 kg ai/ha, (8 to12-day interval) with a PHI of 10 days. Eight trials in Germany, Austria, and the UK were conducted according to the German GAP with either two or four applications. Azoxystrobin residues were (n = 8): < 0.01 (2), 0.04 (2), 0.07, 0.17, 0.42, and 0.46 mg/kg.

The GAP of France and Italy for cauliflower specify a maximum of two applications (12 to14-day interval) at 0.25 kg ai/ha, and a PHI of 14 days. Four trials in Spain were conducted according to the GAP with either two or four applications. Azoxystrobin residues were (n = 4): < 0.01 (2), 0.03, and 0.44 mg/kg.

Kohlrabi

The Meeting received results from supervised trials with azoxystrobin used on kohlrabi in Germany. The GAP of Germany for kohlrabi specifies a maximum of two applications (8 to12-day interval) at 0.25 kg ai/ha, and a PHI of 14 days. Six trials were conducted according to the GAP. Azoxystrobin residues, in ranked order, were (n = 6): < 0.02, 0.03, 0.04, 0.05, 0.06, and 0.09 mg/kg.

The Meeting agreed that the data on broccoli, Brussels sprouts, cabbages (head), cauliflower and kohlrabi could be used to support a "Brassica vegetables" commodity group maximum residue level. The Meeting noted that azoxystrobin residues obtained on broccoli and head cabbage according to the same US GAP for brassica vegetables appear to be from similar populations and decided to combine them. Combined azoxystrobin residues, in ranked order median underlined, were (n = 8): 0.25, 0.32, 0.90, <u>0.93</u>, <u>1.5</u>, 1.8, 2.0, and 2.3 mg/kg.

Based on the data on broccoli and head cabbage, the Meeting estimated a maximum residue level for azoxystrobin in brassica vegetables of 5 mg/kg, an STMR value of 1.2 mg/kg and a highest residue value of 2.3 mg/kg.

Fruiting vegetables, Cucurbits

Cucumber

The Meeting received results from supervised trials with azoxystrobin on cucumber both indoors (glasshouse) in Europe (France, Germany, Greece, and the UK) and in the field in Europe (France, Italy, and Spain) and the USA.

The indoor and field trials in France, Germany, Greece, and the UK were conducted using a spray concentration of 0.02 kg ai/hL with 4–8 applications and a PHI of three days. The rate and PHI corresponds to the GAP of France (0.02 kg ai/hL, three applications, a PHI of three days), which can cover both southern and northern parts of Europe. The GAPs of Italy and Switzerland specify a maximum of 3 applications at 0.025 kg ai/hL with a PHI of three days, i.e., the trials were conducted at 80% of the GAP rate in these countries. Azoxystrobin residues from the indoor trials were (n = 6), 0.03, 0.13 (2), 0.20, 0.49, and 0.75 mg/kg. Azoxystrobin residues from the outdoors trials in Europe were (n = 5): 0.02, 0.04, 0.06, 0.07, and 0.12 mg/kg.

Only two indoor trials in Germany (listed above with residues of 0.13 and 0.13 mg/kg at a PHI of three days) matched the GAP of the Netherlands, which specifies 0.02 kg ai/hL, 3 applications, and a PHI of one day for indoor use. Azoxystrobin residues were (n = 2): 0.19 and 0.23 mg/kg.

The GAP of the USA for cucurbits specifies a maximum of six applications at 0.28 kg ai/ha (with a total seasonal rate of 1.7 kg ai/ha) and a PHI of one day. Nine trials were conducted outdoors in the USA according to US GAP. Azoxystrobin residues were (n = 9): 0.04, 0.05, 0.06 (2), 0.07, 0.09, 0.11, 0.35, and 0.40 mg/kg.

Gherkin

The Meeting received results from supervised trials with azoxystrobin on gherkins in Germany. The GAP of Germany for cucumber specifies a maximum of two applications at 0.25 kg ai/ha, (8 to12-day interval) and a PHI of three days. Four trials in Germany on gherkins were conducted at the GAP rate with four or six applications. Azoxystrobin residues were (n = 4): 0.04, 0.05, 0.06, and 0.15 mg/kg.

Melons

The Meeting received results from supervised trials with azoxystrobin on indoor melons, i.e., in a glasshouse or a poly-tunnel, in Europe (France, Greece, Italy, the Netherlands, and Spain) and in the field in Europe (France, Greece, Italy, and Spain) and the USA.

Most of the indoor and field trials in Europe were conducted using a spray concentration of 0.02 kg ai/hL with 5–8 applications and a PHI of three days. The rate and PHI corresponds to the GAP of the Netherlands for indoor use (0.02 kg ai/hL, three applications, a PHI of three days) and 80% GAP rate for indoor/field application in Italy and Switzerland (0.025 kg ai/hL, three applications, a PHI of three days). Azoxystrobin residues from the indoor trials were (n = 8): 0.03 (2), 0.08, 0.16, 0.17, 0.18, 0.29, and 0.40 mg/kg. Azoxystrobin residues from the field trials in Europe were (n = 8): 0.01, 0.04 (3), 0.06, 0.07, 0.08, and 0.38 mg/kg.

Two field trials on melons in southern France were conducted at 0.20 kg ai/ha, eight applications, and a PHI of three days, which corresponds to the GAPs of France, Italy and Spain for field treatment (0.20 kg ai/ha, three applications, a PHI of three days). Azoxystrobin residues were: 0.06 and 0.09 mg/kg.

In six of the European trials, melon pulp and skin were analysed, azoxystrobin residues found in pulp (n = 6) were: < 0.01, 0.01 (2), 0.02, 0.05, and 0.06 mg/kg.

The GAP of the USA for cucurbits specifies a maximum of six applications (7–14 day intervals) at 0.28 kg ai/ha (total seasonal rate of 1.7 kg ai/ha) and a PHI of one day. Seven field trials were conducted in the USA according to GAP. Azoxystrobin residues were (n = 7): 0.10 (2), 0.16, 0.17 (2), 0.20, and 0.26 mg/kg.

Summer squash

The Meeting received results from supervised trials with azoxystrobin used on summer squash in the USA.

The GAP of the USA for cucurbits specifies a maximum of six applications at 0.28 kg ai/ha (total seasonal rate of 1.7 kg ai/ha) and a PHI of one day. Five trials on summer squash in the USA

were conducted according to the GAP. Azoxystrobin residues, in ranked order, were (n = 5): 0.06, 0.07, 0.09, 0.11, and 0.16 mg/kg.

The Meeting agreed that the results obtained on cucumber, gherkins, melons, and summer squash could be used to support a "Fruiting vegetables, Cucurbits" commodity group maximum residue level. The Meeting noted that the results from indoor trials on cucumber and melon in Europe according to the same GAP gave highest residues. The Meeting also noted that these data sets appear to be from similar populations and decided to combine them. Azoxystrobin residues, in ranked order, were (n = 14): 0.03 (3), 0.08, 0.13 (2), 0.16, 0.17, 0.18, 0.20, 0.29, 0.40, 0.49, and 0.75 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in fruiting vegetables, cucurbits of 1 mg/kg and an STMR value of 0.17 mg/kg. Based on the pulp data for melon, the Meeting estimated an STMR value of 0.02 mg/kg for cucurbits with inedible peel.

Fruiting vegetables, other than cucurbits

Peppers, sweet

The Meeting received results from supervised trials with azoxystrobin on sweet pepper grown in an indoor environment, i.e., in a glasshouse or a poly-tunnel, in Europe (France, Italy, and the Netherlands) and in the field (outdoor) in southern Europe (France, Italy, and Spain).

Seven field trials in southern Europe were conducted using a spray concentration of 0.025 kg ai/hL with six applications and a PHI of three days. The rate and PHI corresponds to the GAP of Italy for indoor/field application (0.025 kg ai/hL, three applications and a PHI of three days) and 125% GAP of Spain (0.020 kg ai/h, three applications and a PHI of three days). Azoxystrobin residues from the field trials were (n = 7), 0.04, 0.17, 0.18, 0.44, 0.45, 0.61, and 0.85 mg/kg.

Five indoor trials were conducted using a spray concentration of 0.025 kg ai/hL with six applications and a PHI of three days. These trials were conducted at the GAP rate of Italy. Azoxystrobin residues were (n = 5): 0.27, 0.35 (2), 0.62, and 1.4 mg/kg.

Two indoor trials in France were conducted at 0.25 kg ai/ha with six applications and a PHI of three days. These trials were conducted at the GAP rate of France (0.25 kg ai/ha, three applications and a PHI of 3 days). Azoxystrobin residues were (n = 2): 0.25 and 0.58 mg/kg.

Tomato

The Meeting received results from supervised trials with azoxystrobin on indoor grown tomatoes (in a glasshouse) in Europe (France, Italy, the Netherlands, and Spain) and in the field in southern Europe (France, Greece, Italy, and Spain).

The indoor and field trials on tomatoes were conducted using a rate of 0.23–0.26 kg ai/ha or a spray concentration of 0.025 kg ai/hL with six applications and a PHI of six days. The rate and PHI correspond to the GAP of France for indoor/field use (0.25 kg ai/ha, three applications and a PHI of three days) or the GAP of Italy for indoor/field use (0.025 kg ai/hL, three applications and a PHI of three days) and the GAP of Switzerland for indoor application (0.025 kg ai/hL, three applications and a PHI of three days).

Six field trials on tomatoes were conducted using a spray concentration of 0.025 kg ai/hL with six applications and a PHI of three days. Azoxystrobin residues were (n = 8): 0.08, 0.15, 0.16, 0.19, 0.39, and 0.41 mg/kg.

Two field trials on tomatoes were conducted using a rate of 0.23–0.26 kg ai/ha with six applications and a PHI of three days. Azoxystrobin residues were (n = 2): 0.31 and 0.40 mg/kg.

Six indoor trials on tomatoes were conducted using or a spray concentration of 0.025 kg ai/hL with six applications and a PHI of six days. Azoxystrobin residues were (n = 6): 0.08, 0.20, 0.29, 0.33, 0.54, and 0.86 mg/kg.

Five field trials on tomatoes were conducted using 0.24–0.26 kg ai/ha with six applications and a PHI of three days. Azoxystrobin residues were (n = 5): 0.14, 0.20, 0.49, 0.54, and 0.69 mg/kg.

The Meeting agreed that the data on sweet pepper and tomato could be used to support a "Fruiting vegetables, other than Cucurbits, except fungi and sweet corn" commodity group maximum residue level. The Meeting noted that indoor trials on sweet pepper and tomato (conducted according to the same GAP with a spray concentration of 0.025 kg ai/hL) gave the highest residues (as compared to the indoor trials at 0.25 kg ai/ha or the field trials). The Meeting also noted that the data on sweet peppers and tomatoes from these trials appear to be from a similar population and decided to combine them. Azoxystrobin residues, in ranked order, were (n = 11): 0.08, 0.20, 0.27, 0.29, 0.33, 0.35 (2), 0.54, 0.62, 0.86, and 1.4 mg/kg

The Meeting estimated a maximum residue level for fruiting vegetables, other than cucurbits, except fungi and sweet corn of 3 mg/kg and an STMR value of 0.35 mg/kg.

Using a default concentration factor of 10 for extrapolation from sweet peppers to dried chilli peppers, the Meeting estimated a maximum residue level for azoxystrobin in dried chilli pepper of 30 mg/kg and an STMR value of 3.5 mg/kg.

Lettuce

The Meeting received results from supervised trials with azoxystrobin on lettuce in France, Spain and the UK.

The GAPs of France, Germany, and the Netherlands for lettuce specifies a rate of 0.25 kg ai/ha, a maximum of three applications (two applications in Germany), and a PHI of 14 days. The GAP of Italy specifies 0.25 kg ai/ha, a maximum of three applications, and a PHI of seven days.

Twelve trials in northern Europe (northern France and the UK) were conducted at the GAP of France, Germany, or the Netherlands. Azoxystrobin residues from these trials were (n = 12): < 0.01 (5), 0.24, 0.25, 0.39, 0.49, 0.56, 1.2, and 1.6 mg/kg.

Eight trials in southern Europe (southern France and Spain) were conducted at the GAP of Italy. Azoxystrobin residues from these trials were (n = 8): 0.12 (2), 0.14, 0.31, 0.44, 0.85, 1.1, and 1.4 mg/kg.

The Meeting noted that the residues in lettuce from the trials in northern and southern Europe appear to be from a similar population (based on the Mann-Whitney U-test). Combined azoxystrobin residues in lettuce, in ranked order median underlined, were (n = 20): < 0.01 (5), 0.12 (2), 0.14, 0.24, 0.25, 0.31, 0.39, 0.44, 0.49, 0.56, 0.85, 1.1, 1.2, 1.4, and 1.6 mg/kg.

The Meeting estimated a maximum residue level for lettuce (head) and lettuce (leaf) of 3 mg/kg and an STMR value of 0.28 mg/kg.

Legume vegetables

The Meeting received results from supervised trials with azoxystrobin on succulent beans and peas in the USA. The GAP of the USA for legume vegetables specify a maximum of six applications at 0.28 kg ai/ha with total seasonal rate of 1.7 kg ai/ha and a PHI of 0 days.

Beans

Six trials in the USA were conducted on succulent beans according to GAP with 7–8 applications. In three trials, the beans were collected without the pods. Azoxystrobin residues in beans without pods were: 0.02, 0.07, and 0.08 mg/kg. In three trials where beans were collected and analysed with the edible pods, azoxystrobin residues were: 0.11, 0.48, and 1.5 mg/kg.

Peas

Six trials in the USA were conducted on succulent peas according to the GAP of the USA with seven applications. In three trials, the peas were collected without the pods. Azoxystrobin residues in peas

without pods were: 0.03, 0.08, and 0.17 mg/kg. In three trials where the peas were collected and analysed with the edible pods azoxystrobin residues were: 0.87, 1.2, and 1.5 mg/kg.

The Meeting agreed that the data on beans and peas obtained from trials according to the same GAP for legume vegetables could be used to estimate a "legume vegetables" commodity group maximum residue level. The Meeting decided to use the higher residues found on beans and peas with pods, for the estimation. Azoxystrobin residues in beans and peas with pods, in ranked order median underlined, were (n = 6): 0.11, 0.48, <u>0.87</u>, <u>1.2</u>, and 1.5 (2) mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in legume vegetables of 3 mg/kg and an STMR value of 1.0 mg/kg.

Soya beans, dry

The Meeting received results from supervised trials with azoxystrobin on soya beans in the USA.

The GAP of the USA for soya beans (seeds) specifies a maximum of 6 applications at 0.28 kg ai/ha with a total sanctioned seasonal total rate of 1.7 kg ai/ha and a PHI of 14 days. Nineteen trials on soya beans in the USA were conducted at the US GAP rate with 5–7 applications and a PHI of 12–16 days. Azoxystrobin residues, in ranked order median underlined, were (n = 19): < 0.01, 0.02 (5), 0.03, 0.05, <u>0.06</u> (3), 0.07, 0.09, 0.12, 0.15, 0.18, 0.23, 0.24, and 0.33 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in soya beans, dry of 0.5 mg/kg and an STMR value of 0.06 mg/kg.

Root and tuber vegetables

The Meeting received results from supervised trials with azoxystrobin on beetroot, carrot, radish, and sugar beet in the USA, on chicory root in France and on potato in Europe.

The GAP of the USA for root vegetables specifies a maximum of six applications at 0.37 kg ai/ha with a total seasonal rate of 2.2 kg ai/ha (six applications) and a PHI of 0 days.

Beetroot

Four trials on beetroot (garden beet) were conducted in the USA using 0.28 kg ai/ha (76% US GAP rate) with a total seasonal application of 2.2 kg ai/ha (six applications) and a PHI of 0 days. Azoxystrobin residues in beetroot, in ranked order, were (n = 4): 0.18, 0.23, 0.32, and 0.34 mg/kg.

Carrot

Six trials on carrot were conducted in the USA according to the US GAP for root vegetables (one trial with eight applications). Azoxystrobin residues in carrot, in ranked order, were (n = 6): 0.03, 0.13, 0.14, 0.17, 0.26, and 0.30 mg/kg.

Chicory root

Five supervised trials with azoxystrobin used on chicory (endive) in France (see chicory and endive leaves for trial details) were conducted according to the GAP of France, which specifies a PHI of 21 days, maximum of three applications at 2.5 kg ai/ha for chicons (the edible part) production (treatment of plants) and 0.25 kg ai/ha for root production (treatment of parts).

Azoxystrobin residues in chicory roots (harvest of chicory leaves and roots at a PHI of 21 days), were (n = 5) 0.06, 0.07, 0.11, 0.25, and 0.46 mg/kg.

Potato

The Meeting received results from supervised trials with azoxystrobin used on potato as soil treatment (whole field or in-furrow) in France, Italy, the Netherlands, Spain, and the UK or as a foliar treatment in Spain and the UK.

For the pre or at planting soil treatment, the GAP of the Netherlands and the UK specify a single application at 1.5 kg ai/ha as an overall or incorporated treatment or a single application at 0.75 kg ai/ha as an in-furrow treatment. The resulting application rates at the actual planting sites of potatoes are comparable (about 1.5 kg ai/ha) because of the reduced field area sprayed in the in-furrow application, i.e., applied as a 50% 'band' treatment.

Six trials in the Netherlands and two trials in the UK were performed using 1.5–1.6 kg ai/ha as a single application. Azoxystrobin residues in potatoes from these trials were (n = 8): < 0.01 (4) and 0.01 (4) mg/kg. Twelve trials were conducted using the same rate (1.5–1.6 kg ai/ha) in Southern Europe (southern France, Italy, and Spain), with azoxystrobin residues being (n = 12): < 0.01 (6), 0.02 (2), 0.03 (3), and 0.07 mg/kg. No GAP was available for potatoes in the southern Europe.

Six trials in the Netherlands were conducted using 0.77–0.8 kg ai/ha as a single in-furrow treatment at planting. Azoxystrobin residues in potato from these trials were (n = 6): < 0.01 (3), 0.02 and 0.03 (2) mg/kg. Four trials in southern France were conducted using 0.37–0.39 kg ai/ha (about 50% GAP rate) as a single in-furrow treatment at planting, resulting in azoxystrobin residues of (n = 4): 0.02 and 0.03 (3) mg/kg.

For the foliar application, the GAP of Germany specifies 0.13 kg ai/ha, a maximum three applications, and a PHI of seven days. The GAP of the Netherlands specifies 0.063 kg ai/ha, a maximum of two applications, and a PHI of seven days. Two trials in the UK, two trials in the Netherlands, and four trials in Spain were conducted according to the GAP of Germany. In addition, two trials in the UK and four trials in Spain were conducted at 200% GAP rate and two trials in the Netherlands were conducted at 50% of German GAP (100% of the GAP of the Netherlands). Azoxystrobin residues in potato in all these trials were < 0.01 (16) mg/kg.

Radish

Five trials on radish were conducted in the USA according to the US GAP for root vegetables. Azoxystrobin residues in radish, in ranked order, were (n = 5): 0.13, 0.16, 0.29, 0.38, and 0.45 mg/kg.

Sugar beet

Nine trials on sugar beet were conducted in the USA according to the US GAP for root vegetables. Azoxystrobin residues in sugar beet, in ranked order, were (n = 9): 0.04, 0.05, 0.06 (2), 0.09 (2), 0.10, 0.11, and 0.24 mg/kg.

The Meeting decided to use the data on beetroot, carrot, and radish according to the same US GAP to estimate a "root and tuber vegetables" commodity group maximum residue level. The Meeting noted that the results on beetroot, carrot, and radish appear to be from a similar population and decided to combine them. Azoxystrobin residues, in ranked order median underlined were (n = 5): 0.03, 0.13 (2), 0.14, 0.16, 0.17, 0.18, <u>0.23</u>, 0.26, 0.29, 0.30, 0.32, 0.34, 0.38, and 0.45 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in root and tuber vegetables of 1 mg/kg, an STMR value of 0.23 mg/kg, and a highest residue value of 0.45 mg/kg.

Stalk and stem vegetables

Artichoke, globe

The Meeting received results from supervised trials with azoxystrobin on artichokes in France, Spain, and the USA.

The GAP of France and Spain specify 0.25 kg ai/ha, a maximum three applications, and a PHI of seven days. Five trials in France and one trial in Spain were conducted according to the GAP of France and Spain. Azoxystrobin residues were (n = 6): 0.16, 0.24, 0.30, 0.42, 0.48, and 0.61 mg/kg.

The GAP of the USA for artichokes specifies a maximum of six applications at 0.28 kg ai/ha with total seasonal rate of 1.7 kg ai/ha and a PHI of 0 days. Three trials on artichokes in the USA were conducted according to the US GAP. Azoxystrobin residues were (n = 3): 1.6, <u>1.8</u>, and 2.4 mg/kg.

The Meeting noted that azoxystrobin residues from the US trials according to the US GAP were significantly higher that those from the European trials that were conducted at French GAP, which specifies a lower application rate and a longer PHI. The Meeting considered three trials acceptable for estimation of a maximum residue level for this minor crop.

The Meeting estimated a maximum residue level for azoxystrobin in artichoke, globe of 5 mg/kg and an STMR value of 1.8 mg/kg.

Asparagus

The Meeting received results from supervised trials with azoxystrobin on asparagus in France and the USA.

The GAP of France for asparagus specifies 0.25 kg ai/ha with a maximum of three applications (a PHI is not required). Four trials on asparagus in France were conducted according to the GAP of France with four applications (PHI of 215–259 days). Azoxystrobin residues from these trials were < 0.01 (4) mg/kg.

The GAP of the USA for asparagus specifies six applications at 0.28 kg ai/ha with total seasonal rate of 1.7 kg ai/ha and a PHI of 100 days. Two trials on asparagus in the USA were conducted according to the US GAP with a PHI of 93 or 104 days. Azoxystrobin residues from both these trials were < 0.02 (2) mg/kg.

The Meeting estimated a maximum residue level for asparagus of 0.01 (*) mg/kg and an STMR value of 0.01 mg/kg.

Celery

The Meeting received results from supervised trials with azoxystrobin used on celery in Italy and the UK. Azoxystrobin residues were determined in trimmed and untrimmed celery.

The GAP of Italy for celery specifies a maximum of three applications at 0.25 kg ai/ha, and a PHI of seven days. Six trials in Italy were conducted at the GAP rate of Italy, with four applications and a PHI of 6–7 days. Azoxystrobin residues in trimmed celery were (n = 6): 0.12, 0.16, 0.19, 0.33, 0.41, and 0.73 mg/kg. Azoxystrobin residues in untrimmed celery were (n = 6): 0.19, 1.0, 1.4, 1.8, 2.0, and 2.5 mg/kg.

Eight trials on celery in the UK were conducted according to the GAP of Germany (0.25 kg ai/ha, two applications, a PHI of 14 days) with 4–7 applications. Azoxystrobin residues in trimmed celery were (n = 8): 0.05, 0.08, 0.09, 0.10, 0.11, 0.23, 0.26, and 0.33 mg/kg. Azoxystrobin residues in untrimmed celery were (n = 7): 0.23, 0.25, 0.28, <u>0.43</u>, 0.96, 2.9 and 3.2 mg/kg.

Based on the data on untrimmed celery in the UK, the Meeting estimated a maximum residue level for azoxystrobin in celery of 5 mg/kg and an STMR value of 0.43 mg/kg.

Witloof chicory (sprouts)

The Meeting received results from supervised trials with azoxystrobin used on witloof chicory in France. The GAP of France specifies a PHI of 21 days, maximum of three applications at 2.5 kg ai/ha for chicons (the edible part) production (treatment of plants) and 0.25 kg ai/ha for root production (treatment of parts).

In five trials, plants were treated twice at the rate of 0.25 kg ai/ha (at intervals of 20–22 days). Fourteen days after the second application mature plants were harvested, the leaves removed, and the roots stored in a climate controlled room.

After 14 days the roots were separated into two batches: the first set of roots were dipped in a solution containing 0.01 kg ai/hL and the second set were sprayed once at a rate of 2.5 kg ai/ha. Following the treatments, hydroponic forcing was performed on both sets of roots in dark climate-controlled rooms. Azoxystrobin residues in chicons from the second set (treatment according to the GAP of France), in ranked order, were (n = 5) 0.03 (2), <u>0.05</u>, 0.10, and 0.11 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in witloof chicory (sprouts) of 0.3 mg/kg and an STMR value of 0.05 mg/kg.

Cereal grains

The Meeting received results from supervised trials with azoxystrobin used on barley, oat, rye, triticale and wheat in Europe and on maize and rice in the USA.

Barley

The Meeting received results in barley grain from supervised trials with azoxystrobin in France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the UK.

The GAP of France for barley specifies a maximum of two applications at 0.25 kg ai/ha, with a 42-day PHI. The GAP of Spain for barley specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 36 days. The GAPs of Germany, Italy and the Netherlands specify a maximum of two applications at 0.25 kg ai/ha, and a PHI of 35 days. The Meeting decided to consider all trials on barley in continental Europe that were conducted at the GAP rate (± 30%) of 0.25 kg ai/ha, 2–3 applications, and a PHI of 35–42 days.

Nineteen trials in France conducted at 72–104% GAP rate, with 2–3 applications and a PHI of 35–42 days (both the highest and lowest residues were obtained at a PHI of 42 days). Azoxystrobin residues, in ranked order, were (n = 19): 0.01 (3), 0.02 (2), 0.03 (2), 0.04 (2), 0.05, 0.08, 0.09, 0.11 (2), 0.12, 0.13 (3), and 0.19 mg/kg.

Two trials in Germany conducted at 100% GAP rate, with three applications, and a PHI of 35 days, resulted in azoxystrobin residues of 0.10 and 0.11 mg/kg. One trial in Germany carried out at 80% GAP rate, with two applications, and a PHI of 37 days resulted in an azoxystrobin residue of 0.02 mg/kg.

Two trials in Italy conducted at 100–104% GAP rate, with two applications, and a PHI of 36 days resulted in azoxystrobin residues of 0.08 and 0.10 mg/kg.

One trial in Netherlands conducted at 100% GAP rate, with two applications, and a PHI of 37 days resulted in azoxystrobin residues of 0.08 mg/kg.

Two trials in Spain conducted at 100% GAP rate, with two applications, and a PHI of 35 days resulted in azoxystrobin residues of 0.03 and 0.11 mg/kg. One trial in Spain carried out at 104% GAP, with two applications, and a PHI of 38 days resulted in an azoxystrobin residue of 0.28 mg/kg.

One trial in Sweden carried out 100% GAP rate, with two applications, and a PHI of 42 days resulted in an azoxystrobin residue of 0.20 mg/kg.

Two trials in Switzerland conducted at 104% GAP rate, with two applications, and a PHI of 36 days resulted in azoxystrobin residues of 0.02 and 0.04 mg/kg. Four trials in Switzerland carried out at 80% GAP, with two applications, and a PHI of 35 days resulted in azoxystrobin residues of 0.01, 0.02 (2) and 0.03 mg/kg.

The GAP of the UK for barley specifies 0.25 kg ai/ha, a maximum two applications, and the latest time of application up to and including watery ripe stage (BBCH growth stage 71). Three trials in the UK were conducted at 100% GAP rate, with three applications, and the last application including growth stage 71 (PHIs at harvest were 38–54 days). Azoxystrobin residues in barley grain were 0.13, 0.14, and 0.23 mg/kg.

Combined azoxystrobin residues in barley grain from the trials in Europe (n = 38), in ranked order median underlined, were: 0.01 (4), 0.02 (6), 0.03 (4), 0.04 (3), 0.05, <u>0.08</u> (3), 0.09, 0.10 (2), 0.11 (4), 0.12, 0.13 (4), 0.14, 0.19, 0.20, 0.23, and 0.28 mg/kg.

Oat, rye, and triticale

The Meeting received results in oat, rye, and triticale grain from supervised trials with azoxystrobin in Germany. The GAP of Germany for oat, rye, and triticale specifies a maximum two applications at 0.25 kg ai/ha, and a PHI of 35 days.

Two trials on oat in Germany conducted at 100% GAP rate, with three applications, and a PHI of 35 or 36 days. Azoxystrobin residues were 0.01 and 0.06 mg/kg.

Two trials on rye in Germany conducted at 100% GAP rate, with three applications, and a PHI of 35 days. Azoxystrobin residues were 0.02 and 0.04 mg/kg.

Two trials on triticale in Germany conducted at 100% GAP rate, with three applications, and a PHI of 36 days. Azoxystrobin residues were < 0.01 and 0.02 mg/kg.

Wheat

The Meeting received results in wheat grain from supervised trials with azoxystrobin on wheat in France, Germany, Italy, Spain, Switzerland, and the UK.

The GAP of France for wheat specifies a maximum of two applications at 0.25 kg ai/ha, with a PHI of 42 days. The GAP of Spain for wheat specifies a maximum two applications at 0.25 kg ai/ha, and a PHI of 36 days. The GAPs of Germany, Italy and the Netherlands for barley specify 0.25 kg ai/ha, a maximum two applications, and a PHI of 35 days. The Meeting decided to consider all trials on wheat in continental Europe that were conducted at the GAP rate (± 30%) of 0.25 kg ai/ha, 2–3 applications, and a PHI of 35–42 days.

Fourteen trials on wheat in France were conducted at 80–104% GAP rate, with 2–3 applications and a PHI of 35–42 days (the highest and lowest residues were obtained at a PHI of 38 and 35–42 days, respectively). Azoxystrobin residues, in ranked order, were: < 0.01 (5), 0.01 (4), 0.02, 0.03 (3), and 0.14 mg/kg.

Four trials in Germany were conducted at 80–100% GAP rate, with 2–3 applications, and a PHI of 35–42 days (both the highest and lowest residues were obtained at a PHI of 35 days). Azoxystrobin residues, in ranked order, were: < 0.01, 0.01, 0.02 and 0.04 mg/kg.

Two trials in Italy were conducted at 100–104% GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residues were: < 0.01 and 0.02 mg/kg.

Three trials in Spain were conducted at 100% GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residues, in ranked order, were: < 0.01, 0.01, and 0.04 mg/kg.

Five trials in Switzerland were conducted at 80–108% GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residues were: < 0.01 (5) mg/kg.

The GAP of the UK for wheat specifies 0.25 kg ai/ha, a maximum two applications, and the latest time of application up to and including watery ripe stage (BBCH growth stage 71). Three trials in the UK were conducted at 100% GAP rate, with three applications, and the last application including growth stage 71 (PHIs at harvest were 40–59 days). Azoxystrobin residues in wheat grain were: 0.01, 0.02, and 0.03 mg/kg.

Combined azoxystrobin residues in wheat grain from the trials in Europe (n = 31), in ranked order median underlined, were: < 0.01 (13), <u>0.01</u> (7), 0.02 (4), 0.03 (4), 0.04 (2) and 0.14 mg/kg.

The Meeting decided to use the data on barley grain to extrapolate to oat and data on wheat grain to extrapolate to rye and triticale.

The Meeting estimated a maximum residue level for azoxystrobin in barley and oat grain of 0.50 mg/kg and an STMR value of 0.08 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in wheat, rye and triticale grain of 0.20 mg/kg and an STMR value of 0.01 mg/kg.

Maize

The Meeting received results in maize grain from supervised trials with azoxystrobin in the USA.

The GAP of the USA for maize specifies a maximum of eight applications at 0.28 kg ai/ha with a total seasonal application of 2.2 kg ai/ha and a PHI of seven days. Twenty trials in the USA were conducted on maize according to the US GAP with a PHI of 6–7 days. Azoxystrobin residues in maize grains in these trials were (n = 20): < 0.01 (17), 0.01 (2), and 0.02 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in maize grain of 0.02 mg/kg and an STMR value of 0.01 mg/kg.

Rice

The Meeting received results in rice grain from supervised trials with azoxystrobin used on rice in the USA.

The GAP of the USA for rice specifies a rate of 0.34 kg ai/ha with a total seasonal rate of 0.78 kg ai/ha and a PHI of 28 days. Sixteen trials were conducted in the USA on rice, in accordance with the US GAP with a maximal seasonal application of 0.78 kg ai/ha (2×0.22 and 1×0.34 kg ai/ha) and a PHI of 26–28 days. Azoxystrobin residues in rice grain, in ranked order median underlined, were (n = 16): 0.07, 0.19, 0.29, 0.30 (2), 0.41, 0.43, 0.62, 0.74, 0.81, 0.89, 1.6, 2.3, 2.8, 3.0 and 3.3 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in rice grain of 5 mg/kg and an STMR value of 0.68 mg/kg.

Tree nuts

The Meeting received results from supervised trials with azoxystrobin used on almonds, pecans, and pistachios in the USA.

Almonds

The GAP of the USA for almonds specifies a maximum of six applications at 0.28 kg ai/ha with a total authorized seasonal rate of 1.7 kg ai/ha and a PHI of 28 days. Five trials in the USA were conducted on almonds according to the US GAP with a PHI of 28–29 days. Azoxystrobin residues in almonds were (n = 5): < 0.01 (4) and 0.01 mg/kg.

Pecans

The GAP of the USA for pecans specifies 0.22 kg ai/ha with total seasonal application of 1.3 kg ai/ha (six applications) and a PHI of 45 days. Six trials in the USA were conducted on pecans at the US GAP rate with six applications. In four trials with a PHI shorter than 45 days (24–42 days), azoxystrobin residues were < 0.01 (4) mg/kg. In two trials with a PHI of 20–25 days, azoxystrobin residues were 0.01 and 0.02 mg/kg.

Based on the data on almonds and pecans, the Meeting estimated a maximum residue level for azoxystrobin in tree nuts, except pistachios of 0.01 mg/kg and an STMR value of 0.01 mg/kg.

Pistachios

The GAP of the USA for pistachios specifies a rate of 0.28 kg ai/ha with a total seasonal rate of 1.7 kg ai/ha (six applications) and a PHI of seven days. Three trials in the USA were conducted on pistachios according to the US GAP. Azoxystrobin residues were 0.25, 0.44, and 0.48 mg/kg. The Meeting considered three trials acceptable for estimation of a maximum residue level for this minor crop.

The Meeting estimated a maximum residue level for azoxystrobin in pistachios of 1 mg/kg and an STMR value of 0.44 mg/kg.

Oilseeds

Cotton seed

The Meeting received results from supervised trials with azoxystrobin used on cotton as in-furrow and foliar treatments in the USA.

For in-furrow treatment, the GAP of the USA specifies 0.019 kg ai/km of row (0.20 oz ai/1000 row feet), which corresponds to the maximum of 0.34 kg ai/ha (for 22-inch rows). Twelve trials were conducted in the USA according to the US GAP for in-furrow treatment immediately before planting. In all these trials, azoxystrobin residues in cottonseed, taken at normal harvest, (PHI of 121–186 days) were < 0.01 (12) mg/kg.

For foliar application, the GAP of the USA for cotton specifies 0.17 kg ai/ha with total seasonal application rate of 0.5 kg ai/ha (three applications) as a foliar spray and a PHI of 45 days. Twelve trials in the USA were conducted with a combined in-furrow application at the planting (0.17 kg ai/ha) and three foliar applications at 0.17 kg ai/ha with a PHI of 45 days. Azoxystrobin residues from these trials, in ranked order, were (n = 12): < 0.01 (5), 0.01 (2), 0.02, 0.03 (3), and 0.54 mg/kg.

Based on the trials with combined foliar and in-furrow (at-planting) application, the Meeting estimated a maximum residue level for azoxystrobin in cotton seed of 0.7 mg/kg and an STMR value of 0.01 mg/kg.

Peanuts

The Meeting received results from supervised trials with azoxystrobin used on peanuts in the USA.

The GAP of the USA for peanuts specifies a rate of 0.45 kg ai/ha with a seasonal total of 0.9 kg ai/ha (two applications) with a PHI of 14 days. Eleven trials on peanuts in the USA were conducted according to the US GAP with a PHI of 13–14 days. Azoxystrobin residues, in ranked order, were (n = 11): < 0.01 (5), 0.01 (4), 0.06, and 0.13 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in peanut of 0.2 mg/kg and an STMR value of 0.01 mg/kg.

Sunflower seed

The Meeting received results from supervised trials with azoxystrobin used on sunflower in the USA.

The GAP of the USA for sunflower specifies a rate of 0.28 kg ai/ha with a seasonal total of 0.5 kg ai/ha and a PHI of 30 days. Six trials on sunflower in the USA were conducted according to the US GAP with a seasonal application of 0.5 kg ai/ha (three applications of 0.12, 0.26, and 0.12 kg ai/ha) and a PHI of 28–30 days. Azoxystrobin residues, in ranked order, were (n = 6): 0.01, 0.03 (2), 0.05, 0.08, and 0.24 mg/kg.

The Meeting estimated a maximum residue level for sunflower seed of 0.5 mg/kg and an STMR value of 0.04 mg/kg.

Herbs

The Meeting received results from supervised trials with azoxystrobin used on basil, chives, mint, and parsley in the USA.

The GAP of the USA for herbs (including basil, chives, parsley) specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications) and a PHI of 0 days.

Three trials on basil were conducted according to the GAP of the USA for herbs with 5–6 applications. Azoxystrobin residues in fresh basil were: 23, 25, and 48 mg/kg. Four trials on chives were conducted according to the US GAP. Azoxystrobin residues in fresh chives were 1.1, 2.7, 4.2,

and 7.3 mg/kg. Two trials on parsley were conducted according to the US GAP with five or six applications. Azoxystrobin residues in fresh parsley were 17 and 20 mg/kg.

The GAP of the USA for mint specifies 0.28 kg ai/ha with maximal seasonal application of 1.7 kg ai/ha (six applications) and a PHI of 0 days for fresh mint and a PHI of seven days for mint intended for processing. Two trials in the USA were conducted on fresh mint according to the US GAP with a PHI of 0 days. Azoxystrobin residues in fresh mint were 21 and 25 mg/kg. Five trials were conducted on mint intended for processing according to the US GAP with a PHI of seven days (one trial with a PHI of six days). Azoxystrobin residues in the trials with a PHI of seven days were 4.8, 5.48, 8.0, and 12 mg/kg. Azoxystrobin residue from the trial with a PHI of six days was 17 mg/kg.

The Meeting noted that significantly higher residues were obtained in basil, parsley, and mint (with a critical PHI of 0 days) as compared to chives. Also, the residues in basil, mint, and parsley appear to be from a similar population, were obtained using the same US GAP rate and PHI, and could be used to support an "herbs, fresh" commodity maximum residue level. Azoxystrobin residues in fresh herbs, in ranked order, were (n = 7): 17, 20, 21, 23, 25 (2), and 48 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in herbs, (fresh) of 70 mg/kg and an STMR value of 23 mg/kg.

Legume animal feeds

Peanut fodder

The Meeting received results in peanut hay from supervised trials with azoxystrobin on peanuts in the USA.

The GAP of the USA for peanuts specifies an application rate of 0.45 kg ai/ha with a seasonal total of 0.9 kg ai/ha (two applications) and a PHI of 14 days. Eleven trials on peanuts in the USA were conducted according to the US GAP with a PHI of 13–14 days. Azoxystrobin residues, in ranked order, were (n = 11): 1.5, 3.0, 3.1, 3.3, 4.0, 4.3, 4.7, 8.3, 8.9, 9.3, and 13 mg/kg. On dry-weight basis (DM=85%), azoxystrobin residues in peanut hay, in ranked order, were (n = 11): 1.8, 3.5, 3.6, 3.9, 4.7, 5.1, 5.5, 9.8, 10, 11, and 15 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in peanut fodder of 30 mg/kg, an STMR value of 5.1 mg/kg and a highest residue value of 15 mg/kg.

Soya bean fodder and forage

The Meeting received results in soya bean forage and hay from supervised trials with azoxystrobin used on soya beans in the USA.

The GAP of the USA for soya bean forage and hay specifies 0.28 kg ai/ha, one application and a PHI of 0 days. Nineteen trials on soya beans forage were conducted according to the US GAP. A portion of forage was dried for hay.

Azoxystrobin residues in soya bean forage (n = 19), in ranked order, were: 4.6, 6.8, 7.1, 7.2, 7.4, 7.6, 7.7, 8.3, 8.5, 9.4, 9.5, 9.9, 10, 11, 12 (2), 18, 20, and 23 mg/kg.

Azoxystrobin residues in soya bean hay, in ranked order, were (n = 19): 6.8, 16 (2), 22 (2), 24, 27 (2), 28, 31, 33 (2), 34, 37, 38 (2), 43, 51 and 53 mg/kg. On dry-weight basis (DM=85%), azoxystrobin residues in soya bean hay were (n = 19): 8.0, 19 (2), 26 (2), 28, 32 (2), 33, 36, 39 (2), 40, 44, 45 (2), 51, 60, and 62 mg/kg.

The Meeting estimated an STMR value of 9.4 mg/kg and a highest residue value of 23 mg/kg for azoxystrobin in soya bean forage and a maximum residue level for azoxystrobin in soya bean fodder (dry-weight basis) of 100 mg/kg, an STMR value of 36 mg/kg, and a highest residue value of 62 mg/kg.

Straw and fodder (dry) of cereal grains

The Meeting received results in cereal straw from supervised trials with azoxystrobin used on barley, oat, rye, triticale and wheat in Europe and rice in the USA. The Meeting also received results in maize fodder from supervised trials with azoxystrobin used on maize in the USA.

Barley straw

The Meeting received results in barley straw from supervised trials with azoxystrobin used on barley in France, Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the UK.

The GAP of France for barley specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 42 days. The GAP of Spain for barley specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 36 days. The GAPs of Germany, Italy and the Netherlands for barley specify 0.25 kg ai/ha, a maximum two applications, and a PHI of 35 days. For barley straw, the Meeting decided to consider all trials on barley in continental Europe that were conducted at the GAP rate (± 30%) of 0.25 kg ai/ha, 2–3 applications, and a PHI of 35–42 days.

Seventeen trials in France were conducted at 72–100% GAP rate, with 2–3 applications and a PHI of 35–42 days (both the highest and lowest residues were obtained at a PHI of 42 days). Azoxystrobin residues, in ranked order, were: 0.53, 0.65, 0.67, 0.72, 0.82, 0.84, 0.91 (2), 1.2, 1.3 (3), 1.6 (2), 2.9, 3.6 and 3.7 mg/kg.

Two trials in Germany were conducted at the GAP rate, with three applications, and a PHI of 35 days, resulting in azoxystrobin residues of 2.2 and 2.9 mg/kg. One trial in Germany was carried out at 80% GAP rate, with two applications, and a PHI of 37 days. Azoxystrobin residue was 0.58 mg/kg.

Two trials in Italy were conducted at 100–104% GAP rate, with two applications, and a PHI of 36 days. Azoxystrobin residues were 2.3 (2) mg/kg.

One trial in Netherlands was conducted at the GAP rate, with two applications, and a PHI of 37 days. Azoxystrobin residue was 1.5 mg/kg.

One trial in Spain was conducted at the GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residue was 1.2 mg/kg. One trial in Spain was carried out at 104% GAP, with two applications, and a PHI of 38 days. Azoxystrobin residue was 5.5 mg/kg.

One trial in Sweden was carried out the GAP rate, with two applications, and a PHI of 42 days. Azoxystrobin residue was 5.3 mg/kg.

Two trials in Switzerland were conducted at 104% GAP rate, with two applications, and a PHI of 36 days. Azoxystrobin residues were 0.39 and 0.48 mg/kg. Four trials in Switzerland were carried out at 80% GAP, with two applications, and a PHI of 35 days. Azoxystrobin residues were 0.50, 0.61, 0.71, and 0.94 mg/kg.

The GAP of the UK for barley specifies 0.25 kg ai/ha, a maximum two applications, and the latest time of application up to and including watery ripe stage (growth stage 71). Three trials in the UK were conducted at the GAP rate, with three applications, and the last application including growth stage 71 (PHIs at harvest were 38–54 days). Azoxystrobin residues in barley straw were 1.6, 3.4, and 4.5 mg/kg.

Combined azoxystrobin residues in barley straw from the trials in Europe (n = 35), in ranked order, were: 0.39, 0.48, 0.50, 0.53, 0.58, 0.61, 0.65, 0.67, 0.71, 0.72, 0.82, 0.84, 0.91 (2), 0.94, 1.2 (2), 1.3 (3), 1.5, 1.6 (3), 2.2, 2.3 (2), 2.9 (2), 3.4, 3.6, 3.7, 4.5, 5.3, and 5.5 mg/kg.

On dry-weight basis (DM=89%), azoxystrobin residues in barley straw were (n = 35): 0.44, 0.54, 0.56, 0.60, 0.65, 0.69, 0.73, 0.75, 0.80, 0.81, 0.92, 0.94, 1.0 (2), 1.1, 1.3 (2), 1.5 (3), 1.7, 1.8 (3), 2.5, 2.6 (2), 3.3 (2), 3.8, 4.0, 4.2, 5.1, 6.0, and 6.2 mg/kg.

Maize fodder

The Meeting received results in maize fodder from supervised trials with azoxystrobin used on maize in the USA.

The GAP of the USA for maize specifies 0.28 kg ai/ha with maximal seasonal application of 2.2 kg ai/ha (eight applications) and a PHI of seven days. Twenty trials in the USA were conducted on maize according to the US GAP with a PHI of 6–7 days. Azoxystrobin residues in maize fodder, in ranked order, were (n = 20), 0.88, 1.1, 2.5, 2.6 (2), 2.9, 3.1, 3.2, 3.5, 4.0, 4.4, 4.7, 5.2, 5.3, 7.8, 8.7 (2), 9.3, 16, and 21 mg/kg.

On dry-weight basis (DM=83%), azoxystrobin residues in maize fodder were (n = 20), 1.1, 1.3, 3.0, 3.1 (2), 3.5, 3.7, 3.9, 4.2, 4.8, 5.3, 5.7, 6.3, 6.4, 9.4, 10 (2), 11, 19, and 25 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in maize fodder (dry-weight basis) of 40 mg/kg, an STMR value of 5.0 mg/kg, and a highest residue value of 25 mg/kg.

Oat, rye and triticale straw

The Meeting received results in oat, rye, and triticale straw from supervised trials with azoxystrobin in Germany. The GAP of Germany for oat, rye, and triticale specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 35 days.

Two trials on oat in Germany were conducted at the GAP rate, with three applications, and a PHI of 35 or 36 days. Azoxystrobin residues were 1.0 and 1.5 mg/kg. On dry-weight basis (DM=90%), azoxystrobin residues in oat straw were (n = 2), 1.1 and 1.6 mg/kg.

Two trials on rye in Germany were conducted at the GAP rate, with three applications, and a PHI of 35 days (higher residues were obtained at 42 and 44-day PHIs). Azoxystrobin residues were 2.0 and 2.7 mg/kg. On dry-weight basis (DM=88%), azoxystrobin residues in rye straw were (n = 2) 2.3 and 3.1 mg/kg.

Two trials on triticale in Germany were conducted at the GAP rate, with three applications, and a PHI of 36 days. Azoxystrobin residues were 1.4 and 1.5 mg/kg. On dry-weight basis (DM=90%), azoxystrobin residues in triticale straw were (n = 2), 1.6 and 1.7 mg/kg.

Rice straw

The Meeting received results in rice straw from supervised trials with azoxystrobin used on rice in the USA.

The GAP of the USA for rice specifies 0.34 kg ai/ha with maximal seasonal application of 0.78 kg ai/ha and a PHI of 28 days. Sixteen trials in the USA were conducted on rice according to the US GAP with a maximal seasonal application of 0.78 kg ai/ha (2×0.22 and 1×0.34 kg ai/ha) and a PHI of 26–28 days. Azoxystrobin residues in rice straw (n = 16), in ranked order, were: 0.59, 0.62, 0.78, 0.84, 0.91, 1.9, 2.6, 2.7, 3.2, 4.1, 4.2 (2), 5.0, 6.4, 6.9, and 10 mg/kg.

On dry-weight basis (DM=90%), azoxystrobin residues in rice straw were (n = 16): 0.66, 0.69, 0.87, 0.93, 1.0, 2.1, 2.9, 3.0, 3.6, 4.6, 4.7 (2), 5.6, 7.1, 7.7, and 11 mg/kg.

Wheat straw

The Meeting received results in wheat straw from supervised trials with azoxystrobin used on wheat in France, Germany, Italy, Spain, Switzerland, and the UK.

The GAP of France for wheat specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 42 days. The GAP of Spain for wheat specifies 0.25 kg ai/ha, a maximum two applications, and a PHI of 36 days. The GAPs of Germany, Italy and the Netherlands for barley specify 0.25 kg ai/ha, a maximum two applications, and a PHI of 35 days. The Meeting decided to consider all trials on wheat in continental Europe that were conducted at the GAP rate (± 30%) of 0.25 kg ai/ha, 2–3 applications, and a PHI of 35–42 days.

Thirteen trials on wheat in France were conducted at 80–104% GAP rate, with 2–3 applications and a PHI of 35–42 days. Azoxystrobin residues in wheat straw, in ranked order, were: 0.36, 0.73, 0.75, 0.81, 0.83, 1.7, 1.8, 2.3, 2.4, 2.5, 3.2, 3.5, and 6.2 mg/kg.

Four trials in Germany were conducted at 80–100% GAP rate, with 2–3 applications, and a PHI of 35–42 days (both the highest and lowest residues were obtained at a PHI of 35 days). Azoxystrobin residues, in ranked order, were: 0.36, 0.50, 1.2, and 1.7 mg/kg.

Two trials in Italy were conducted at 100–104% GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residues were 1.6 and 3.8 mg/kg.

Three trials in Spain were conducted at the GAP rate, with two applications, and a PHI of 35 and 41 days (the 41-day PHI gave the highest residue). Azoxystrobin residues, in ranked order, were: 1.2, 1.9, and 3.5 mg/kg.

Five trials in Switzerland were conducted at 80–108% GAP rate, with two applications, and a PHI of 35 days. Azoxystrobin residues were: 0.22, 0.41 (2), 0.46, and 0.58 mg/kg.

The GAP of the UK for wheat specifies 0.25 kg ai/ha, a maximum two applications, and the latest time of application up to and including watery ripe stage (BBCH growth stage 71). Three trials in the UK were conducted at the GAP rate, with three applications, and the last application including growth stage 71 (PHIs at harvest were 40–59 days). Azoxystrobin residues in wheat straw were 1.6, 2.3, and 5.7 mg/kg.

Combined azoxystrobin residues in wheat straw from the trials in Europe (n = 30), in ranked order, were: 0.22, 0.36 (2), 0.41 (2), 0.46, 0.50, 0.58, 0.73, 0.75, 0.81, 0.83, 1.2 (2), 1.6 (2), 1.7 (2), 1.8, 1.9, 2.3 (2), 2.4, 2.5, 3.2, 3.5 (2), 3.8, 5.7, and 6.2 mg/kg.

On dry-weight basis (DM=88%), azoxystrobin residues in wheat straw were (n = 30): 0.25, 0.41 (2), 0.47 (2), 0.52, 0.57, 0.66, 0.83, 0.85, 0.92, 0.94, 1.4 (2), 1.8 (2), 1.9 (2), 2.0, 2.2, 2.6 (2), 2.7, 2.8, 3.6, 4.0 (2), 4.3, 6.5, and 7.0 mg/kg.

The Meeting agreed that the data on barley, oat, rice, rye, triticale, and wheat straw appear to be from a similar population and could be combined to estimate a "Straw and fodder (dry) of cereal grains, except maize" commodity group maximum residue level. On dry-weight basis, azoxystrobin residues, in ranked order median underlined, were (n = 87): 0.25, 0.41 (2), 0.44, 0.47 (2), 0.52, 0.54, 0.56, 0.57, 0.60, 0.65, 0.66 (2), 0.69 (2), 0.73, 0.75, 0.80, 0.81, 0.83, 0.85, 0.87, 0.92 (2), 0.93, 0.94 (2), 1.0 (3), 1.1 (2), 1.3 (2), 1.4 (2), 1.5 (3), 1.6, <u>1.7</u> (3), 1.8 (5), 1.9 (2), 2.0, 2.1, 2.2, 2.3, 2.5, 2.6 (4), 2.7, 2.8, 2.9, 3.0, 3.1, 3.3 (2), 3.6 (2), 3.8, 4.0 (3), 4.2, 4.3, 4.6, 4.7 (2), 5.1, 5.6, 6.0 6.2, 6.5, 7.0, 7.1, 7.7, and 11 mg/kg.

On dry-weight basis, the Meeting estimated a maximum residue level for straw and fodder (dry) of cereal grains, except maize of 15 mg/kg, an STMR value of 1.7 mg/kg, and a highest residue value of 11 mg/kg.

Forage of cereal grains

The Meeting received results in cereal forages from supervised trials with azoxystrobin used on barley, oat, rye, triticale and wheat in Europe and on maize in the USA.

Barley, oat, rye, triticale and wheat forage

The Meeting received results in barley and wheat forage from supervised trials with azoxystrobin applied to barley and wheat in France, Germany, Italy, the Netherlands (barley only), Spain, Switzerland, and the UK. The Meeting also received results in oat, rye, and triticale forage from supervised trials in Germany.

The GAPs in Europe do not specify a PHI for cereal forage. In the case of livestock grazing, it is assumed that animals are unlikely to be foraging within seven days of the application of the fungicide. Therefore, the Meeting decided to consider all trials conducted at ± 30% of the GAP rate

available in Europe (0.25 kg ai/ha), with 2–3 applications and with forage data obtained at a PHI of seven days.

Azoxystrobin residues in barley forage (n = 10), in ranked order, were: 0.54, 0.73, 0.75, 1.1, 1.6, 1.8, 1.9, 3.8, 3.9, and 4.0 mg/kg.

Azoxystrobin residues in wheat forage (n = 10), in ranked order, were: 0.61, 1.4, 1.6 (2), 1.8, 1.9, 2.9, 3.2, 4.0, and 5.4 mg/kg.

For oat, rye, and triticale, the Meeting received residue data in forage for days 0 and 20–23 from seven trials.

The Meeting decided to use the data on barley forage to extrapolate to oat forage and data on wheat forage to extrapolate to rye and triticale forage. The Meeting estimated an STMR value of 1.7 mg/kg and a highest value of 4.0 mg/kg for azoxystrobin in barley and oat forage. The Meeting estimated an STMR value of 1.9 mg/kg and a highest residue value of 5.4 mg/kg for azoxystrobin in wheat, rye and triticale forage.

Maize forage

The Meeting received results in maize forage from supervised trials of azoxystrobin applied to maize in the USA.

In the 20 maize trials, harvested for grain and fodder, in the USA (conducted according to the US GAP of 0.28 kg ai/ha with a seasonal total rate of 2.2 kg ai/ha), forage was harvested at the milk stage, 6–7 days after the sixth application (out of eight applications for fodder and grain) of azoxystrobin. Azoxystrobin residues in maize forage (n = 20), in ranked order, were: 0.49, 0.58, 0.65, 0.83, 0.94, 1.0, 1.1, 1.2 (2), 1.5, 1.7, 2.4, 2.7, 2.8 (3), 2.9, 3.6, 3.8, and 7.2 mg/kg.

The Meeting estimated an STMR value of 1.6 mg/kg and a highest residue value of 7.2 mg/kg for azoxystrobin in maize forage.

Sugar beet leaves and tops

The Meeting received results in sugar beet tops from supervised trials with azoxystrobin in the USA. The GAP of the USA for root vegetables (both for leaves and root) specifies a rate of 0.37 kg ai/ha with a seasonal total of 2.2 kg ai/ha (six applications) and a PHI of 0 days.

Nine trials on sugar beet were conducted in the USA according to the US GAP for root vegetables. Azoxystrobin residues in sugar beet tops, in ranked order, were: 5.8, 8.7, 9.5, 11, 16 (2), 22, 25, and 44 mg/kg.

The Meeting estimated an STMR value of 16 mg/kg and a highest residue value of 44 mg/kg for azoxystrobin in sugar beet tops.

Dried herbs

The Meeting received results in dried herbs from supervised trials with azoxystrobin used on basil, chives, and parsley in the USA and on hops in Germany and the UK.

Basil, chives and parsley, dry

The GAP of the USA for herbs (including basil, chives, parsley) specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications) and a PHI of 0 days.

Two trials on basil were conducted in the USA according to the US GAP. Azoxystrobin residues in dried basil were 139 and 235 mg/kg.

Three trials on chives were conducted in the USA according to the US GAP. Azoxystrobin residues in dried chives were 27, 31, and 45 mg/kg.

Two trials on parsley were conducted in the USA according to the US GAP with five or six applications. Azoxystrobin residues in dried parsley were 135 and 165 mg/kg.

The Meeting decided to use the results on dried basil and parsley for the estimation of a maximum residue level for dried herbs, except dry hops. Azoxystrobin residues were (n = 4), 135, 139, 165, and 235 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in dried herbs, except dry hops of 300 mg/kg and an STMR value of 152 mg/kg.

Hops, dry

The GAP of Germany for hops specifies a rate of 0.19 kg ai/ha up to BBCH 37, 0.25 kg ai/ha up to BBCH 55, and 0.4 kg ai/ha above BBCH 55, with a total seasonal rate of 0.8 kg ai/ha and a PHI of 28 days.

Four trials on hops in the UK were carried out using six applications of 0.4 kg ai/ha and a PHI of 28 days or two applications at 0.20 kg ai/ha, followed by two applications at 0.30 kg ai/ha and two applications at 0.40 kg ai/ha, with a PHI of 27–28 days. Azoxystrobin residues were (n = 4) 0.83, 1.1, 1.3, and 2.2 mg/kg.

Four trials on hops in Germany were carried out using two applications at 0.23–0.25 kg ai/ha, followed by two applications at 0.30–0.36 kg ai/ha and two applications at 0.40–0.46 kg ai/ha, with a PHI of 26–28 days. Azoxystrobin residues were (n = 4): 5.7, 11 (2), and 12 mg/kg.

Based on the data from the German trials, the Meeting estimated a maximum residue level for azoxystrobin in hops, dry of 30 mg/kg and an STMR value of 11 mg/kg.

Almond hulls

The Meeting received results in almond hulls from supervised trials with azoxystrobin on almonds in the USA.

The GAP of the USA for almonds specifies a rate of 0.28 kg ai/ha with a seasonal total of 1.7 kg ai/ha (six applications) and a PHI of 28 days. Five trials in the USA were conducted on almonds according to the US GAP. Almonds were harvested slightly immature (PHI of 28–29 days) and mature (PHI of 43–44 days). In each trial, azoxystrobin residues in hulls of the mature almonds were higher than those in slightly immature almonds (a PHI specified in the US GAP). Azoxystrobin residues in hulls of mature almonds, in ranked order, were (n = 5): 0.69, 1.5, 1.9, 2.1, and 3.0 mg/kg.

On dry-weight basis (DM=90%), azoxystrobin residues in almond hulls, in ranked order, were (n = 5): 0.77, 1.7, 2.1, 2.3, and 3.3 mg/kg.

On dry-weigh basis, the Meeting estimated a maximum residue level for azoxystrobin almond hulls of 7 mg/kg and an STMR value of 2.1 mg/kg.

Fate of residues during processing

The Meeting received information on the fate of azoxystrobin residues during processing of oranges, grapes, plums, tomato, barley, corn, rice, wheat, soya beans, sunflower, and peanuts and on azoxystrobin fate under hydrolysis conditions simulating commercial food processing.

In a high-temperature hydrolysis study, 97–101% of radiolabelled azoxystrobin remained under conditions simulating industrial processing (temperatures ranging from 90–120 °C; pH 4–6). Therefore, azoxystrobin can be considered stable to simulated pasteurization, baking, brewing, boiling and sterilization.

The processing factors obtained in the processing studies and estimated STMR-P values are summarized in the table below.

Raw agricultural commodity			Processed commodity			
Name	STMR		CCN	Name	Processing	STMR-P

	(mg/kg)				factor [a]	(mg/kg)
Orange [b]	4.9		JF 0004	Orange juice	< 0.08	0.39
				Orange oil, cold-pressed	4.8	24
			AB 0001	Citrus pulp, dry	1.9	9.3
Grapes	0.53			Distillate	< 0.04	0.02
			DF 0269	Dried grapes (raisins)	0.45	0.24
			JF 0269	Grape juice	0.36	0.19
				Grape must	0.52	0.28
			AB 0269	Grape pomace, dry	5.0	2.7
				Grape pomace, wet	3.1	1.6
				Pasteurized wine	0.54	0.29
				Spirit	< 0.04	0.02
				Wine	0.67	0.36
Plum [c]	0.74		DF 0014	Prunes	0.19	0.14
Tomato [d]	0.44			Tomato conserve	< 0.12	0.05
			JF 0448	Tomato juice	0.36	0.16
				Tomato ketchup	0.47	0.21
			VW 0448	Tomato paste	2.6	1.1
				Tomato pomace, dry	24	11
				Tomato pomace, wet	9.2	4.0
				Tomato puree	0.8	0.35
Barley	0.08			Barley malt	0.10	0.01
				Barley roots	0.45	0.04
				Barley spent grain	0.15	0.01
				Beer	0.03	0.002
Maize	0.01		CF 1255	Maize flour	0.73	0.01
				Maize grits	0.27	0.003
			CF 0645	Maize meal	0.55	0.01
			OR 0645	Maize oil, refined (dry milling)	0.64	0.01
			OR 0645	Maize oil, refined (wet milling)	6.1	0.06
				Maize starch	< 0.09	0.001
Rice	0.68		CF 0649	Rice bran, processed	1.2	0.82
			CM 1205	Rice grain, polished	0.09	0.06
			CM 1207	Rice hulls	4.8	3.3
Wheat	0.01		CF 0654	Wheat bran	0.38	0.004
			CP 1211	Wheat bread, white	0.13	0.001
			CP 1212	Wheat bread, wholemeal	< 0.13	0.001

Raw agricultural commodity			Processed commodity			
Name	STMR (mg/kg)		CCN	Name	Processing factor [a]	STMR-P (mg/kg)
			CF 1210	Wheat flour, low grade	0.25	0.003
			CF 1210	Wheat flour, patent	0.25	0.003
			CF 1212	Wheat flour, wholemeal	0.25	0.003
				Wheat shorts	0.13	0.001
Soya beans	0.06		AB 0541	Soya bean hulls	2.2	0.13
			AB 1265	Soya bean meal	0.09	0.01
			OR 0541	Soya bean oil, refined	0.77	0.05
Sunflower	0.04			Sunflower meal	< 0.08	0.003
			OR 0702	Sunflower oil, refined	0.15	0.01
Peanuts	0.01			Peanut meal	1.0	0.01
			OC 0697	Peanut oil, crude	4.0	0.04
			OR 0697	Peanut oil, refined	3.0	0.03

[a] Processing factors were mostly obtained in a single study on each crop, except for grapes (4 studies, but a single study for raisins) and tomato (3 studies), in which case a median processing factor was calculated.

[b] STMR and HR values for citrus fruit commodity group.

[c] STMR and HR values for stone fruit commodity group.

[d] STMR and HR values for fruiting vegetables, other that cucurbits, except fungi and sweet corn commodity group.

Based on the STRM-P value of 0.06 mg/kg, the Meeting estimated a maximum residue level of 0.1 mg/kg for azoxystrobin in maize oil, refined.

Farm animal dietary burden

The Meeting estimated the dietary burden of azoxystrobin in farm animals on the basis of the diets listed in Annex 6 of the 2006 JMPR Report (OECD Feedstuffs Derived from Field Crops). Calculation from the highest residue, STMR (some bulk commodities) and STMR-P values provides the levels in feed suitable for estimating maximum residue levels, while calculation from STMR and STMR-P values for feed is suitable for estimating STMR values for animal commodities.

The table below shows estimated maximum and mean dietary burdens for beef cattle, dairy cattle, broilers, and laying poultry based on the animal diets from the United States/Canada, the European Union, and Australia. The calculations are provided in Annex 6 of the 2008 Report of the JMPR.

		Azoxystrobin, Animal dietary burden (ppm of dry matter diet)		
		US-Canada	EU	Australia
Beef cattle	Maximum	34	55	58
	Mean	15	19	32 [a]
Dairy cattle	Maximum	33	72 [b]	39
	Mean	16	27 [c]	20
Poultry - broiler	Maximum	0.44	0.62	0.59
	Mean	0.44	0.40	0.59
Poultry - layer	Maximum	0.44	23 [d]	0.59
	Mean	0.44	9.1[e]	0.59

[a] Highest mean beef cattle dietary burden suitable for STMR estimates for mammalian meat.

[b] Highest maximum cattle dietary burden suitable for MRL estimates for milk and mammalian meat.

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

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

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

Farm animal feeding studies

The Meeting received information on lactating dairy cow and laying hen feeding studies.

Fifteen lactating cows were randomly assigned among five dosing groups of three animals each: one control group and four groups dosed at one of three azoxystrobin feeding levels each (5, 25, 75 and 250 ppm based on measured feed intake). All groups were fed for 30 consecutive days. Milk samples were taken twice a day and the daily production bulked into one single sample per cow. Samples of milk collected on days 21–23 were processed into cream and skimmed milk. Average fat contents in the whole milk and cream were 3.7% and 55%, respectively.

Azoxystrobin residues in whole milk, skimmed milk, milk cream and tissues obtained at the 5, 25, 75 and 250 ppm dosing levels in the diet are summarized in the table below.

Matrix	Dose (ppm)	Highest residue, mg/kg	Mean residue, mg/kg
Whole milk	5	0.003	0.002
	25	0.006	0.002
	75	0.004	0.002
	250	0.009	0.004
Skimmed milk	5	< 0.001	< 0.001
	25	< 0.001	< 0.001
	75	0.001	0.001
	250	0.003	0.002
Milk cream	5	< 0.01	< 0.01
	25	< 0.01	< 0.01
	75	0.02	0.01
	250	0.04	0.03
Muscle	5	< 0.01	< 0.01
	25	< 0.01	< 0.01
	75	< 0.01	< 0.01
	250	< 0.01	< 0.01
Liver	5	< 0.01	< 0.01
	25	0.01	0.01
	75	0.05	0.03

Matrix	Dose (ppm)	Highest residue, mg/kg	Mean residue, mg/kg
	250	0.07	0.05
Kidney	5	< 0.01	< 0.01
	25	< 0.01	< 0.01
	75	0.01	0.01
	250	0.02	0.02
Fat[a]	5	< 0.01	< 0.01
	25	< 0.01	< 0.01
	75	0.03	0.02
	250	0.03	0.02

[a] Residues in peritoneal fat, which were higher than residues obtained in subcutaneous fat.

The azoxystrobin residues in muscle were lower than in fat. Also, azoxystrobin accumulated in the cream when whole milk was processed to skimmed milk and cream.

In a hen feeding study, forty eight laying hens were divided into four groups and each group was divided into three pens holding four birds each. Each group was fed for 28 consecutive days with a nominal dose rate of 0, 6, 18, or 60 ppm of azoxystrobin in the diet. Eggs were collected twice daily and the total daily production for each group bulked. On day 21, the eggs were separated into egg yolk and egg white.

At the 60 ppm dosing level in the diet, azoxystrobin residues in eggs (whole egg, egg white, egg yolk) and tissues (muscle, liver, and fat) were < 0.01 mg/kg in all analysed samples. No analyses were carried out on the samples from the lower dose rate groups.

Animal commodity maximum residue levels

The dietary burdens for the estimation of maximum residue levels for azoxystrobin in animal commodities are 72 ppm for cattle and 22 ppm for poultry. The dietary burdens for the estimation of STMR values for animal commodities are 32 ppm for beef cattle, 27 ppm for dairy cattle and 9.1 ppm for poultry.

In the table below, dietary burdens for cattle are shown in round brackets (), feeding levels and resulting residue concentrations in square brackets [], and estimated azoxystrobin concentration related to the dietary burdens are shown without brackets.

Dietary burden (ppm) Feeding level [mg/kg]	Milk	Cream	Muscle	Liver	Kidney	Fat
MRL Cattle	Mean	Mean	Highest	Highest	Highest	Highest
(72)	0.002	0.01	< 0.01	0.048	0.01	0.029
[25, 75]	[0.002, 0.002]	[< 0.01, 0.01]	[< 0.01,< 0.01]	[0.01, 0.05]	[< 0.01, 0.01]	[< 0.01, 0.03]
STMR Beef Cattle			Mean	Mean	Mean	Mean
(32)			< 0.01	0.013	0.01	0.01
[25, 75]			[< 0.01, < 0.01]	[0.01, 0.03]	[< 0.01, 0.01]	[< 0.01, 0.02]
STMR Dairy Cattle	Mean	Mean				
(27)	0.002	0.01				

[25, 75]	[0.002, 0.002]	[< 0.01, 0.01]

Maximum dietary burden of 72 ppm for cattle is very close to the 75 ppm dosing level in the cattle feeding study. The residues in muscle were significantly lower (all < 0.01 mg/kg even at the dosing level of 250 ppm) than in fat. Based on the highest residues at the dosing levels of 25 and 75 ppm, the interpolated (estimated) highest residues for the dietary burden of 72 ppm were 0.048 mg/kg in liver, 0.01 mg/kg in kidney, and 0.029 mg/kg in fat.

Based on the mean residues for the dosing levels of 25 and 75 ppm, the interpolated (estimated) mean residues for the beef cattle dietary burden of 32 ppm were 0.013 mg/kg in liver, < 0.01 mg/kg in kidney, and 0.01 mg/kg in fat.

On the fat basis, the Meeting estimated a maximum residue level of 0.05 mg/kg for meat (fat) from mammals (other than marine mammals) and an STMR value of 0.01 mg/kg. Based on the liver results, the Meeting estimated a maximum residue level of 0.07 mg/kg for mammalian edible offal and an STMR value of 0.01 mg/kg.

Based on the mean residues for the dosing levels of 25 and 75 ppm, the interpolated (estimated) mean residues for the dairy cattle dietary burdens of 72 ppm and 27 ppm were in both cases 0.002 mg/kg in milk and 0.01 mg/kg in cream. Based on the average fat content in the cream (55 in the feeding study), the calculated mean residue in milk fats would be 0.018 mg/kg.

The Meeting estimated a maximum residue level for azoxystrobin in whole milk of 0.01 mg/kg and an STMR value of 0.01 mg/kg. The Meeting estimated a maximum residue level for azoxystrobin in milk fats of 0.03 mg/kg and an STMR value of 0.03 mg/kg.

For poultry, the maximum dietary burden of 22 ppm is lower that the dose level of 60 ppm in the hen feeding study, which resulted in azoxystrobin residues < 0.01 mg/kg in eggs and tissues. The Meeting estimated maximum residue levels of 0.01 (*) mg/kg and STMR value of 0 mg/kg for poultry meat (fat), poultry edible offal, and eggs.

RECOMMENDATIONS

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

Definition of the residue for compliance with MRLs and estimation of dietary intake in plant and livestock commodities: azoxystrobin. Azoxystrobin is fat-soluble.

CCN	Commodity	MRL (mg/kg)	STMR or STMR-P (mg/kg)
AB 0660	Almond hulls	7 dw	2.1 dw
VS 0620	Artichoke, globe	5	1.8
VS 0621	Asparagus	0.01*	0.01
FI 0327	Banana	2	0.03[a]
	Barley forage		1.7
GC 0640	Barley grain	0.5	0.08
	Barley malt		0.01
	Barley roots		0.04
	Barley spent grain		0.01
	Beer		0.002
FB 0018	Berries and other small fruits, except cranberry, grapes, and strawberry	5	1.0

CCN	Commodity	MRL (mg/kg)	STMR or STMR-P (mg/kg)
VB 0040	Brassica vegetables	5	1.2
VA 0035	Bulb vegetables	10	2.2
VS 0624	Celery	5	0.43
FC 0001	Citrus fruits	15	4.9
AB 0001	Citrus pulp, dry		9.3
SO 0691	Cotton seed	0.7	0.01
FB 0265	Cranberry	0.5	0.23
DF 0269	Dried grapes (= currants, raisins and sultanas)		0.24
DH 0170	Dried herbs, except dry hops	300	152
MO 0105	Edible offal (mammalian)	0.07	0.01
PE 0112	Eggs	0.01*	0
VC 0045	Fruiting vegetables, Cucurbits	1	0.17 (0.02[a])
VO 0050	Fruiting vegetables, other than cucurbits, except fungi and sweet corn	3	0.35
JF 0269	Grape juice		0.19
	Grape must		0.28
AB 0269	Grape pomace, dry		2.7
	Grape pomace, wet		1.6
FB 0269	Grapes	2	0.53
HH 0092	Herbs	70	23
DH 1100	Hops, dry	30	11
VP 0060	Legume vegetables	3	1.0
VL 0482	Lettuce, Head	3	0.28
VL 0483	Lettuce, Leaf	3	0.28
CF 1255	Maize flour		0.01
AS 0654	Maize fodder	40 dw	5.0 dw
	Maize forage		1.6
GC 0645	Maize grain	0.02	0.01
	Maize grits		0.003
CF 0645	Maize meal		0.01
OR 0645	Maize oil, refined	0.1	0.06
	Maize starch		0.001
FI 0345	Mango	0.7	0.05[a]
MM 0095	Meat from mammals (other than marine mammals)	0.05 (fat)	0.01
FM 0183	Milk fats	0.03	0.03
ML 0106	Milks	0.01	0.01
	Oat forage		1.7
GC 0647	Oats	0.5	0.08
JF 0004	Orange juice		0.39
	Orange oil, cold-pressed		24
FI 0350	Papaya	0.3	0.02[a]
SO 0697	Peanut	0.2	0.01
AL 0697	Peanut fodder	30 dw	5.1 dw
	Peanut meal		0.01
OC 0697	Peanut oil, crude		0.04

CCN	Commodity	MRL (mg/kg)	STMR or STMR-P (mg/kg)
OR 0697	Peanut oil, refined		0.03
HS 0444	Peppers, chilli (dried)	30	3.5
TN 0675	Pistachios	1	0.44
FI 0354	Plantain	2	0.03[a]
PM 0110	Poultry meat	0.01*	0
PO 0111	Poultry, edible offal of	0.01*	0
DF 0014	Prunes		0.14
GC 0649	Rice	5	0.68
CF 0649	Rice bran, processed		0.82
CM 1205	Rice grain, polished		0.06
CM 1207	Rice hulls		3.3
VR 0075	Root and tuber vegetables	1	0.23
	Rye forage		1.9
GC 0650	Rye	0.2	0.01
AL 0541	Soya bean fodder	100 dw	36 dw
AL 1265	Soya bean forage		9.4
AB 0541	Soya bean hulls		0.13
AB 1265	Soya bean meal		0.01
OR 0541	Soya bean oil, refined		0.05
VD 0541	Soya bean (dry)	0.5	0.06
FS 0012	Stone fruits	2	0.74
AS 0081	Straw and fodder (dry) of cereal grains, except maize	15 dw	1.7 dw
FB 0275	Strawberry	10	1.3
AV 0596	Sugar beet leaves or tops		16
	Sunflower meal		0.003
OR 0702	Sunflower oil, refined		0.01
SO 0702	Sunflower seed	0.5	0.04
	Tomato conserve		0.05
JF 0448	Tomato juice		0.16
	Tomato ketchup		0.21
VW 0448	Tomato paste		1.1
	Tomato pomace, dry		11
	Tomato pomace, wet		4.0
	Tomato puree		0.35
TN 0085	Tree nuts, except pistachios	0.01	0.01
	Triticale forage		1.9
GC 0653	Triticale	0.2	0.01
CF 0654	Wheat bran		0.004
CP 1211	Wheat bread, white		0.001
CP 1212	Wheat bread, wholemeal		0.001
CF 1210	Wheat flour, low grade		0.003
CF 1210	Wheat flour, patent		0.003
CF 1212	Wheat flour, wholemeal		0.003
	Wheat forage		1.9
GC 0654	Wheat	0.2	0.01

CCN	Commodity	MRL (mg/kg)	STMR or STMR-P (mg/kg)
	Wheat shorts		0.001
	Wine		0.36
VS 0469	Witloof chicory (sprouts)	0.3	0.05

[a] STMR values in edible portion (pulp).

dw=dry-weight basis

DIETARY RISK ASSESSMENT

Long-term intake

The International Estimated Daily Intakes (IEDIs) of azoxystrobin based on STMR and STMR-P values estimated for 82 commodities or commodity groups for the thirteen GEMS/Food regional diets were 2–10% of the maximum ADI (0.2 mg/kg bw). The results are shown in Annex 3 of the 2008 Report of the JMPR. The Meeting concluded that the long-term dietary intake of azoxystrobin residues is unlikely to present a public health concern.

Short-term intake

The 2008 Meeting decided that an ARfD for azoxystrobin is unnecessary and concluded that the short-term dietary intake of azoxystrobin is unlikely to present a public health concern.

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