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OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

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Review of New Uses

SUBJECT Azoxystrobin (128810): Almonds, Tree Nuts, Pistachios, Rice, Cucurbits, Plantains, Muscadines, Wheat, Roses, and Christmas trees

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The Environmental Risk Branch III has completed the environmental fate and effects review (attached) for the proposed new uses of azoxystrobin. Because the amended product label also allows aerial application for current uses that were registered only for ground application, those uses also were reviewed for possible increased exposure of off-site plants and aquatic organisms. ERB III's findings and conclusions are summarized below.

The review team would like to thank Henry Nelson and Harry Craven for performing the secondary reviews and Jim Lin and Ron Parker for providing refined aquatic EECs.

Environmental Fate

Degradation: Azoxystrobin is stable to hydrolysis but degrades through photolysis (water and soil)

Metabolism: Azoxystrobin is moderately persistent in aerobic and anaerobic soils In laboratory studies, several metabolites were observed, but only one (Compound 2) was detected at a significant concentration (<10% of applied).

Mobility Based on the batch equilibrium K_d's values and the McCall's Mobility Classification Scale, azoxystrobin showed immobility to low mobility in all tested soils. Three major degradates (Compound 2, Compound 30 and Compound 28) were detected and found to have greater potential to move through soil than the parent compound.

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Field Dissipation Azoxystrobin slowly dissipated on the surface (0-6 inches) of non-flooded soils, with DT_{50} ranging from 8 to 24 days, while compound 2 was seen to leach into deep soil (up to 18 inches) Other degradates were detected in the surface soils but at minimal concentrations

An aquatic field dissipation study was conducted in rice paddies. Azoxystrobin residues were detected in soil sediment immediately following the third treatment, and steadily declined to below the limit of detection after a year Residues in paddy water dissipated much more rapidly (between 7 and 8 weeks) than in soil. Degradate Compound 2 was observed at low levels in both soil/sediment and water samples, with a shorter half-life in the water.

Ground and Surface Water Concerns

Although azoxystrobin is moderately persistent in laboratory studies, EFED believes that ground water contamination resulting from azoxystrobin use is not of great concern, as the leaching potential of this chemical is limited due to its high soil/water partitioning. Although a degradate (Compound 2) possesses greater potential to move into ground water, it is unlikely that this degradate will pose a major ground water concern if azoxystrobin uses are limited to minor crops (grapes, tomatoes, bananas, etc.) and to areas where soils are not permeable and the water table is not shallow. Surface waters contamination by azoxystrobin could be of concern if spray drift and runoff are not controlled.

Ecological Risks

Terrestrial animals: Minimal acute and chronic risks are presumed for birds and mammals.

Freshwater animals: Acute LOCs are exceeded for invertebrates and fish, although "high" risk is expected only for invertebrates from application to turf. However, because the aquatic EECs for turf are based on GENEEC, which is a screening model, they may be somewhat conservative. Nevertheless, unless the registrant conducts monitoring studies demonstrating EECs are below a level of concern for acute exposure, turf should be considered a candidate for restricted use classification. For fish, the restricted use LOC is exceeded for turf, rice, roses, and Christmas trees, and the endangered species LOC also is exceeded for cucurbits, pecans, pistachios, tree nuts, peaches, tomatoes, and bananas and plantains. For invertebrates, the restrited use LOC is exceeded for turf, rice, cucurbits, pecans, pistachios, tree nuts, peaches, tomatoes, bananas and plantains, Christmas trees, and roses; wheat also exceeds the LOCs for endangered species.

Chronic LOCs are exceeded for freshwater invertebrates for applications to turf, rice, Christmas trees, and roses.

Estuarine/marine animals Acute high risk to non-endangered and endangered invertebrates is presumed for applications to turf and rice grown in coastal counties. LOCs for restricted use and endangered species are exceeded for fish from applications on turf and rice and for invertebrates from applications on peanuts and tomatoes.

Chronic risk to invertebrates is presumed for all four crops (rice, turf, peanuts, tomatoes) grown in coastal counties. Chronic exposure might not occur in estuarine areas subject to tidal flushing but should be of concern in areas where residue may accumulate in the water column.

Plants. Risk to non-endangered terrestrial plants, is low, but risk is presumed for endangered species exposed to runoff and drift from treated turf. High risk to aquatic plants is expected for non-vascular species exposed to azoxystrobin from treated rice and turf. Risk to non-endangered and endangered aquatic vascular species is expected to be low for all uses.

Risk Reduction Options

The registrant should consider lowering application rates, numbers of applications, and increasing application intervals if feasible, especially for turf. Zeneca might also propose other options for minimizing contamination of aquatic environments.

Data Requirements

A data requirements table is attached. No additional fate or ecotoxicity data are required to support the proposed new uses.

Endangered Species Concerns

Endangered species LOCs are exceeded [redacted] estuarine/marine fish, estuarine/marine invertebrates, and terrestrial plants. Zeneca should address these concerns via the Endangered Species Task Force. ERBIII has attached a list of endangered species potentially at risk from these uses of azoxystrobin. Please note that for the endangered "clam group", the only use sites of concern are turf and rice.

Labeling

The product label has an appropriate "Environmental Hazards" section, including a ground water advisory statement.

Contact Bill Erickson at 305-6212 if you have any questions about this review.

ERBIII REVIEW
AZOXYSTROBIN - PROPOSED NEW USES

Use Characterization

Azoxystrobin is a broad-spectrum fungicide currently registered for ground-spray applications on turf, grapes, peanuts, pecans, peaches, bananas, and tomatoes. Zeneca is applying for new uses to control diseases of almonds, tree nuts, plantains, Christmas trees, muscadines, pistachios, rice, cucurbits (cucumbers, cantaloupe, gourd, pumpkin, squash, zucchini, watermelon, honeydew melon, muskmelon), roses, and wheat. The proposed amended product labels will allow aerial spray applications and chemigation for all uses of azoxystrobin, including those previously registered only for ground-spray application. Azoxystrobin is typically applied in alternating spray programs with fungicides having a different mode of action, and it may be tank mixed with other registered crop protection products.

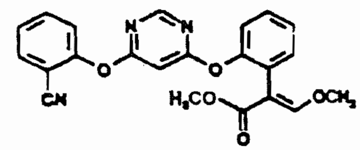
Azoxystrobin is a β-methoxyacrylic acid derivative whose chemical structure is based on naturally occurring strobilurins. Strobilurins are produced by wood-decaying mushrooms to inhibit invasion by other fungi. The mode of action is inhibition of mitochondrial respiration by prevention of electron transfer between cytochrome b and cytochrome c_1.

Application information for the proposed new sites is tabulated below. Both ground and aerial applications are proposed for all use sites.

Use Site	Single Appl. Rate (lb ai/A)	Max. No. Appl.	Appl. Interval (days)	Max. lb ai/A/year
Muscadines	0.16 - 0.25	6	10 - 14	1.5
Plantains	0.09 - 0.135	8	12 - 14	1.08
Almonds	0.10 - 0.25	6	10 - 14	1.5
Tree Nuts	0.10 - 0.20	6	7 - 21	1.2
Pistachios	0.10 - 0.20	6	7 - 21	1.2
Rice	0.10 - 0.30	3	7 - 14	0.7
Cucurbits	0.10 - 0.25	6	7 - 14	1.5
Christmas trees	0.10 - 0.25	8	7 - 21	1.5
Roses	0.05 - 0.25	8	7 - 21	1.5
Wheat	0.07 - 0.20	2	not specified	0.4

Physical/Chemical Properties

Chemical name	Methyl (E)-2-{2-[6-(6-2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate	
Common name	Azoxystrobin (ICIA5504)	
CAS =	131860-33-8	
Empirical Formula:	$C_{22}H_{17}N_3O_5$	
Molecular Weight.	403.4	
Solubility in Water:	6.7 mg/L at 20°C	
Vapor Pressure:	8.2 x 10^{-13} mm Hg at 20°C	
Chemical Number:	128810	



Environmental Fate Assessment

Overview

Based on the acceptable and supplemental environmental fate data, the dissipation of azoxystrobin may occur by microbial-mediated degradation ($t_{1/2}$ = 7 to 23 weeks) and by leaching and runoff. However, the primary dissipation pathway of this chemical is photodegradation on soil and in water; the half-lives ranged from 18 to 28 days for soil, and 11 to 17 days for water while the dark control samples were stable throughout the studies (less than 5% degradation of the parent compound for both water and soil). Laboratory data also show that azoxystrobin will not hydrolyze in aquatic environments and is moderately persistent in aerobic (DT_{50} = 54 to 164 days) and anaerobic soils (DT_{50} = 49 to 56 days). However, the magnitude of its partitioning coefficients (K_d = 1.5 to 23 mL/g) should limit its leaching potential into the ground water. Also note that, since azoxystrobin is mostly foliar applied to treat fungus on leaves, foliar interception and subsequent photodegradation on foliage could substantially reduce the amount of azoxystrobin reaching the soil and therefore available for leaching and runoff.

Transformation products of azoxystrobin (Compounds 2, 28, and 30) exhibit much lower soil/binding affinity (K_d = 0.35 to 11 mL/g) than the parent compound, and thus possess greater potential to leach through soils, in particular, compound 2 which is shown to be weakly absorbed into soils. This degradate was detected in most of the laboratory studies in low to moderate amounts and was also observed to leach through soil in the terrestrial field dissipation and the aquatic soil dissipation studies.

The following sections are summaries of the environmental fate studies. A detailed discussion of each study is included in Appendix VI.

Degradation and Metabolism

Hydrolysis (Guideline Reference Number 161-1) - Azoxystrobin is stable over a 30-day study period, in pH 5 and 7 buffer solutions at 25°C and 50°C, and in pH 9 at 25°C. However at 50°C and in pH 9 solution, the half-life was estimated at 209 hours (8.7 days). Several transformation products were observed, but only two major compounds were identified. Compound 2 (maximum 10% of total applied radioactivity at 292 hours (12.15 days)) and Compound 20 (maximum 7% of applied at 292 days).

Photolysis (161-2 161-3) - Azoxystrobin photodegrades under <u>aqueous</u> conditions (pH 7 buffered solution irradiated with a Xenon lamp). Half-lives ranged from 11 to 17 Florida equivalent summer days. Six phototransformation products were identified: Compound 9 (maximum 15% of applied), Compound 13 (maximum1.7% of applied), Compound 21 (maximum 5.6% of applied), Compound 24 (maximum 2.6% of applied), Compound 28 (maximum 8.9% of applied) and Compound 30 (maximum 2.4% of applied). The concentration of compound 9, the major degradate, reached the maximum level at 5 to 10 days after irradiation, then declined to less than 7% at 30 days posttreatment. No observable pattern of formation and degradation was observed for the other degradates. Azoxystrobin in the dark control samples was stable .

Azoxystrobin also photodegrades in <u>soil</u> , with a DT_{50} of 11 days. The calculated first order half-lives ranged from 18 to 28 days. Eight transformation products were identified in irradiated treatments, however no observable pattern of formation and degradation was observed: Compound 3 (maximum 0.7% of applied), Compound 9 (maximum 9% of applied), Compound 13 (maximum 3.5% of applied), Compound 19 (maximum 6% of applied), Compound 24 (maximum 3.2% of applied), Compound 28 (maximum 6.5% of applied), Compound 30 (maximum 5.0% of applied), Compound U13 (maximum 5.2% of applied). Degradation of azoxystrobin in the dark control was minimal.

Aerobic Soil Metabolism (162-1) - Azoxystrobin is moderately persistent to persistent in the Hyde Farm soil (DT_{50} = 54 days) and the Visalia soil (DT_{50} = 164 days). The first order degradation half-lives ranged from 72 to 164 days. Four metabolites were identified: Compound 2 (maximum 12 to 28% of applied), Compound 3 (maximum 3% of applied), Compound 28 (maximum 3.1% of applied) and Compound 36 (maximum 2.8% of applied). The concentration of compound 2 was at maximum of 12 to 20% at 62 days, 9.5 to 15.2 % at 120 days then declined to 1.4 to 5.5% at 365 days posttreatment, in the United Kingdom soils. In the Visalia soil, compound 2 was found at 28% of applied at 365 days posttreatment. Volatile residues in aerobic soils were tentatively identified as CO_2 (2 to 27% of applied).

Anaerobic Soil Metabolism (162-2 / 162-3)- Azoxystrobin is moderately persistent in anaerobic mineral soils. The 50% dissipation time is 7 to 8 weeks in flooded sandy loam and sandy clay loam soils, within 2.1 days in the test water, and 8.6 to 9.2 weeks in anaerobic soils. The major transformation products observed in the test soils (water-soil systems) were:

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Compound 2 (maximum 68% of applied). Compound 3 (maximum 0.6% of applied). Compound 28 (maximum 4.2% of applied, predominantly in soil extracts), and Compound 36 (maximum 1.1% of applied). The maximum concentration of compound 2 in water-soil systems was noted at 181 days posttreatment, then declined to 46 to 54% at 360 days. In surface water, this degradate ranged from 19 to 21% at 181 days and declined to 11 to 17% at 360 days posttreatment. In soil extracts, it ranged from 39 to 48% at 181 days and decreased to 35% at 360 days. The cumulative concentration of $^{14}CO_2$ (volatile residues) was less than 5% of applied radioactivity.

Soil Microbial Effects - Studies showed that azoxystrobin amendment to soils had an increase of 6 to 12% in KCL extractable soil nitrate (NO_3^-) concentration over the non-treated controls, and a negligible increase in ammonium (NH_4^+). The effect of amended soils on the microbial activity associated with N mineralization and respiration is therefore minimal. Note that this study is not a Subdivision N guideline study.

<u>**Mobility**</u> (163-1)

Based on the batch equilibrium K_d's values and the McCall's Mobility Classification Scale, azoxystrobin showed medium to low mobility in all tested soils. The Freundlich adsorption coefficients (K_d's) ranged from 1.5 mL/g (1/n = 0.90) in the Lilly Field sand soil to 23 mL/g (1/n = 0.90) in the NRTC silty clay loam, and the desorption coefficients from 2.3 mL/g (1/n = 0.84) in the Lilly Field sand soil to 29 mL/g (1/n = 0.85) in the NRTC silty clay loam. Three major degradates were identified: Compound 2 (K_d = 0.35 to 6.8 mL/g; 1/n = 0.76 to 0.90), Compound 30 (K_d = 0.27 to 4.2 mL/g; 1/n = 0.92 to 0.96) and Compound 28 (K_d = 0.76 to 11 mL/g; 1/n = 0.81 to 0.94). **These results suggest that the degradates were more mobile and had greater potential to leach through soil than the parent compound.**

All volatility studies for azoxystrobin were waived based on its low vapor pressure.

<u>**Field Dissipation**</u>

Terrestrial Field Dissipation (164-1) - Eight studies were reported on the field dissipation of azoxystrobin and its transformation products. Results showed that azoxystrobin dissipated in the surface soils with DT_{50} values ranging from 8 to 24 days and calculated $t_{1/2}$ values from 28 to 85 days. In every study, the maximum azoxystrobin concentration in surface soil was observed immediately following the last application, then slowly declined to non-detected after three to four months posttreatment. No parent residue was seen in soil deeper than 6 inches. Several transformation products identified in the laboratory studies were also detected in the field: Compound 2, a major metabolite in both soil aerobic and anaerobic studies, was found 18 inches deep into the soil profile at 377 days after the last treatment (California turf site); however, its concentration in the 12 - 18 inches layer is non significant (≤0.02mg/kg). Compound 9 and Compound 28 (photodegradation products) were found from immediately after posttreatment to 30 to 62 days after the third application in soil (0 - 6 inches). Compound 30, another photodegradation product of azoxystrobin, was analyzed for but not detected at either site.

Aquatic Field Dissipation (164-2) - Field dissipation studies were conducted on two sites (California and Mississippi). However, only the Mississippi study was included in this assessment, since the California study was incomplete, as it did not include the analyses of floodwater flowing out of the site

Azoxystrobin was sprayed at a total rate of 0.9 lb a.i./A (3 applications at 0.3 lb a.i./A each at intervals of 10 and 22 days) to flooded sandy loam and silt loam soil plots planted with rice The parent compound dissipated rapidly in paddy water, with a mean half-life and a mean DT_{90} of 4 days and 13 days after the final application, respectively. Residue concentrations in paddy water reached a maximum of 0.208 mg/l 2 days immediately following the first application, decreased to 0.117 mg/l after the second application and increased to 0.194 mg/l after the third application On the day of the final draining of the paddies (9 days after the third application), the concentration decreased to 0.026 mg/l. In soil cores, the parent compound reached a maximum of 0.10 mg/kg immediately after the second treatment, then slowly dissipated to 0.06 mg/kg 184 days after the third treatment, and to 0.03 mg/kg after 373 days. Four degradates were analyzed, however only Compound 2 (R234886) was detected at below the detection limits (0.025 mg/l and 0.03 mg/kg for Mississippi water and soil samples, respectively).

Foliar Dissipation - The study was only submitted to assess the contribution of foliar dissipation to the overall field dissipation process of azoxystrobin. Based on the reported data, it was determined that foliar wash-off does not appear to be a major route of dissipation of azoxystrobin, since there was no substantial increase in residues in the soil surfaces immediately after rainfall.

Spray Drift

201-1 Droplet Size Spectrum / 201-2 Drift Field Evaluation - No azoxystrobin-specific spray drift studies were reviewed. The registrant, Zeneca, is a member of the Spray Drift Task Force (SDTF) The SDTF has completed and submitted to the Agency a series of studies intended to characterize off-target spray drift potential due to various factors, including application methods, application equipment, meteorological conditions, crop geometry and droplet characteristics. EFED is currently evaluating these studies. After its review, the Agency will determine whether a reassessment is warranted of the potential risks from the application of azoxystrobin to nontarget organisms

Terrestrial Exposure Assessment

EECs for Birds and Mammals

The estimated environmental concentrations (EECs) on food items following a foliar application are based on Hoerger and Kenaga (1972) as modified by Fletcher et al. (1994). The predicted 0-day maximum and mean EECs expected on avian and mammalian food items immediately following a direct single application of 1 lb ai/acre are tabulated below. EECs for other application rates are presumed to increase or decrease proportionally with an increase or decrease in the application rate

Estimated Environmental Concentrations on Avian and Mammalian Food Items (ppm) Following a Single Application of 1 lb ai/A[1]

Food Items	EEC (ppm) Predicted Maximum Residue	EEC (ppm) Predicted Mean Residue
Short grass	240	85
Broadleaf plants and Insects	135	45
Seeds	15	7

[1] predicted maximum and mean EECs for a 1 lb ai A application rate are based on Hoerger and Kenaga (1972) as modified by Fletcher et al. (1994)

EECs resulting from multiple applications are estimated from EFED's "FATE" program The EECs for each use site are determined from the maximum application rate, maximum number of applications, minimum application interval, and a first-order degradation half-life. For azoxystrobin, the soil metabolism half-life of 164 days is presumed to represent an approximate degradation rate on food items. The EEC for acute exposure is the highest one-day value and is referred to as the peak EEC. The EEC for chronic exposure is an average value for a specified time period that is based on the number of applications and the application interval.

Plants

Terrestrial plants inhabiting "dry" and "semi-aquatic" areas may be exposed to pesticides from runoff, spray drift or volatilization. Dry areas are located adjacent to the treatment site and are assumed to receive sheet runoff from one treated acre onto one untreated acre after each application. Semi-aquatic areas are wetter sites located away from treatment sites, and they are assumed to receive channelized runoff from10 treated acres onto 1 untreated acre after each application. EFED's plant exposure scenario is based on the application rate, application method (ground or air), and the water solubility of the pesticide. The amount of pesticide that runs off is a proportion of the application rate and is assumed to be 1%, 2%, or 5% for water solubility values of ≤10 ppm, 10-100 ppm, and >100 ppm, respectively. Spray drift from a ground application is assumed to be 1% of the application rate and drift from aerial or airblast applications is assumed to be 5% of the application rate. For an aerial application, EFED assumes an application efficiency of 75%. Degradation of active ingredient off-site is assumed to be 164 days, based on the soil metabolism half-life. Formulas for calculating runoff and drift onto off-site areas are presented in Appendix I.

Water Resource Assessment

Since azoxystrobin is a new chemical, monitoring data are not available to confirm surface and ground water residue from actual use conditions. Drinking water values are estimated

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using GENEEC (surface water) and SCI-GROW (ground water) models. However, if LOCs are exceeded based on the screening EECs derived from GENEEC, refined aquatic EECs will be generated using the PRZM EXAMS model

Ground Water

EFED believes that in spite of its relatively high persistence in soils used in laboratory studies, the leaching potential of azoxystrobin is limited due to the magnitude of its soil/water partitioning (K_d = 1.5 to 23 mL/g). Transformation products of azoxystrobin (Compounds 2, 28 and 30), on the other hand, exhibit mobility properties of pesticides found in ground water, especially Compound 2 Its leaching potential is therefore expected to be high since it is not as strongly adsorbed in soils as the parent compound. However, based on the field dissipation studies, it is unlikely that this degradate will pose a major ground water concern. At a total 5 lb a.i./A application, compound 2 was detected in the surface soil and in the 6 - 18 inches soil layers. However, its concentration in the12 - 18 inches soil layer is non significant (≤0.02 mg/kg). Additional fate data is necessary to accurately assess the environmental risk of this degradate, if azoxystrobin uses greatly exceeded the field study application rate.

According to the SWAT Team Second Interim Report, dated June 20, 1997, the SCI-GROW estimated concentration of azoxystrobin on turf is 0.06 ppb. Inputs and outputs for SCI-GROW are provided in Appendix II. Turf was chosen as to provide an upper-bound estimate for ground water contamination since it has the highest application rate among all proposed uses (9 applications per year, with a 10-day interval and a rate of 0.55 lb. ai/A/application). A quantitative SCI-GROW estimate for Compound 2 was not feasible due to insufficient fate data.

Surface Water

Although foliar interception and subsequent photodegradation on the foliage and soil will reduce the amount of azoxystrobin available for runoff, EFED believes that the azoxystrobin can potentially contaminate surface waters through spray drift, penetration of the canopy to the soil surface at application, and foliar washoff followed by runoff. Based on the half-lives ($t_{1/2}$ = 49 to 164 days), azoxystrobin is expected to be available for runoff for several months. Its soil/water partitioning (K_d = 1.5 to 23 mL/g) also indicates that runoff could be more by dissolution as opposed to adsorption on eroding soil. Since photolysis (DT_{50} = 11 to 17 days) is the major route of degradation for azoxystrobin, the dissipation of this chemical in water is likely to be dependent on physical components of the water (e.g., sediment loading, depth, etc.) which have effect on sunlight penetration. Azoxystrobin should therefore be less persistent in clear shallow water bodies, but will probably be more persistent in turbid and/or deeper waters, particularly those with long hydrological residence times. The soil/water partitioning values (K_d's) indicate that the concentrations on suspended or bottom sediments should be higher than those of sediment pore water and water column. Sediment bound azoxystrobin can potentially desorb (assuming equilibrium conditions where $K_{d\text{-}ads} = K_{d\text{-}des}$) into the dissolved water column, however, dissolved azoxystrobin is not expected to bioaccumalate (K_{ow} = 316.22) in fish tissues. Sediment bound azoxystrobin is also expected to be moderately persistent ($t_{1/2}$ = 49 to 164 days) as suggested by persistence in aerobic and anaerobic soils.

Transformation products of azoxystrobin (Compounds 2, 28 and 30) have the potential to move into surface waters, in particular Compound 2. This degradate has relatively low soil water partitioning coefficients (K_d = 0.35 to 10 mL/g) and some persistence in laboratory and field studies. Therefore Compound 2 should be available for runoff via dissolution in runoff water, but for a shorter time period than azoxystrobin.

Uncertainties in the surface water assessment for azoxystrobin are the extent of foliar interception and rates of foliar dissipation, the dissipation of azoxystrobin from spray drift, the adequacy of the K_{oc} model to describe azoxystrobin partitioning in mineral soils, and the degradation rate of azoxystrobin and its transformation products in aquatic environments. These uncertainties could be partially addressed with additional data on foliar dissipation and aquatic metabolism for azoxystrobin.

Tier I GENEEC modeling indicates the maximum surface water concentration of azoxystrobin on a variety of crops ranges from 141 for turf to 13 µg/L for wheat. For aquatic use (rice) a modified GENEEC estimated an acute 1-day EEC of 117 µg/L and chronic 56-day of 95 µg/L. The input values and screening EECs for surface water are provided in Appendices III and IV.

Refined Aquatic Exposure

Tier II estimated environmental (EEC) surface water concentrations were calculated for azoxystrobin on almond, cucurbits, grapes, and peanuts using the Pesticide Root Zone Model (PRZM 3.1) and the Exposure Analysis Modeling Systems (EXAMS 2.97.5). The input and more detailed tabular output values, and the cumulative exceedance curves for the PRZM/EXAMS runs are provided in Appendix V.

EECs for Aquatic Exposures - Water Column Dissolved Concentrations (ppb or µg/L):

Crop	Application method	Application rate #appl/interv	Peak Initial (ppb)	4-day average (ppb)	21-day average (ppb)	60-day average (ppb)	90-day average (ppb)	yearly (ppb)
Almond	Airblast/ Aerial	0.25 lb ai/A 6/10 days	4.1	4.1	3.8	3.5	3.2	2.1
Cucurbits	Aerial	0.25 lb ai/A 6/7 days	32	31	30	28	26	14
Grapes	Airblast/ Aerial	0.25 lb ai/A 6/14	5	4.9	4.6	4.2	3.9	2.7
Peanuts	Aerial	0.4 lb ai/A 2/30	11.3	11.1	10.3	9.5	8.8	4.1

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Ecological Toxicity Data

Birds, Acute and Subacute

An acute oral toxicity study using the technical grade of the active ingredient (TGAI) is required to establish the toxicity of azoxystrobin to birds. The preferred test species is either mallard or northern bobwhite. Results of this test are tabulated below.

Avian Acute Oral Toxicity

Species	% ai	LD50 (mg/kg)	Toxicity Category	MRID No. (Author Year)	Study Classification
Northern bobwhite (*Colinus virginianus*)	96.2	2000[1]	practically nontoxic	436781-08 (Hakin et al. 1992)	core
Mallard (*Anas platyrhynchos*)	96.2	250[2]	not determined	436781-09 (Hakin et al. 1992)	supplemental[3]

[1] no mortality
[2] one mortality occurred at 2000 mg/kg
[3] because several test birds vomited food containing the test substance, an LD50 could not be determined

The core study for northern bobwhite established an LD50 >2000 mg/kg, which categorizes azoxystrobin as practically nontoxic to birds on an acute oral basis. The guideline (71-1) is fulfilled (MRID 436781-08).

Two subacute dietary studies using the TGAI are required to establish the toxicity of azoxystrobin to birds. The preferred test species are mallard and northern bobwhite. Results of these tests are tabulated below.

Avian Subacute Dietary Toxicity

Species	% ai	LC50 (ppm)	Toxicity Category	MRID No. (Author Year)	Study Classification
Northern bobwhite (*Colinus virginianus*)	96.2	5200[1]	practically nontoxic	436781-10 (Hakin et al., 1992)	core
Mallard (*Anas platyrhynchos*)	96.2	5200[2]	practically nontoxic	436781-11 (Hakin et al., 1992)	core

[1] one mortality occurred at 650 ppm but was not considered to be treatment-related
[2] no mortality

Because the LC50 values for mallard and northern bobwhite exceed 5000 ppm, azoxystrobin is categorized as practically nontoxic to birds on a dietary basis. The guideline (71-2) is fulfilled (MRIDs 436781-10, 436781-11).

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Birds, Chronic

Avian reproduction studies using the TGAI are required for azoxystrobin because: (1) multiple applications may subject birds to repeated or continuous exposure during or preceding the breeding season, and (2) azoxystrobin is stable in the environment (soil aerobic metabolism half-life = 164 days) to the extent that potentially toxic amounts may persist on food items. The preferred test species are the mallard and northern bobwhite. Results of these tests are tabulated below.

Avian Reproduction Findings

Species	% ai	NOEC LOEC (ppm)	Affected Endpoints	MRID No (Author Year)	Study Classification
Mallard *(Anas platyrhynchos)*	96.2	NOEC = 1200 LOEC = 3000	egg production	436781-13 (Cameron et al. 1994)	core
Northern bobwhite *(Colinus virginianus)*	96.2	NOEC = 1200 LOEC = 3000	egg production	444523-01 (Gallagher et al. 1997)	core

Based on a significant reduction in the number of eggs laid by mallards and bobwhite dosed at 3000 ppm, a chronic NOEC of 1200 ppm is indicated for birds. The guideline (71-4) is fulfilled (MRID 436781-13, 444523-01).

Mammals, Acute and Chronic

Wild mammal testing is required on a case-by-case basis, depending on the results of lower tier laboratory mammalian studies, intended use patterns, and pertinent environmental fate characteristics of the pesticide. Laboratory rat or mouse toxicity values obtained from the Agency's Health Effects Division usually substitute for wild mammal testing. The available data for azoxystrobin are tabulated below.

Mammalian Acute and Chronic Toxicity

Species	% ai	Toxicity Value	Toxicity Category	MRID No.
Laboratory rat *(Rattus norvegicus)*	95.2	LD50 5000 mg kg	practically nontoxic	436781-22
Lab. rat		NOEC = 300 ppm LOEC = 1500 ppm	na	436781-44
Rabbit		NOEC = 16,500 ppm LOEC 16,500 ppm	na	440587-01

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Based on the acute oral test with the laboratory rat, azoxystrobin is considered practically nontoxic to small mammals on an acute oral basis. Decreased pup body weights of first and second generation pups, reduced food consumption and increased liver weights in females, histopathologically observed cholangitis, and increased weanling liver weights for both generations were reported at a test level of 1500 ppm in a rat two-generation reproductive study. No fetal toxicity occurred in rabbits dosed at up to 16,500 ppm in a developmental study.

Insects

A honey bee acute contact study using the TGAI is required for azoxystrobin because its use on crops may result in honey bee exposure. Formulation testing is not required for azoxystrobin, but a study was submitted and reviewed. Results of these tests are tabulated below.

Nontarget Insect Acute Contact Toxicity

Species	% ai	LD50 (µg/bee)	Toxicity Category	MRID No. (Author/Year)	Study Classification
Honey bee (*Apis mellifera*)	96.2	200	practically nontoxic	436781-66 (Gough et al. 1993)	core
Honey bee	51.6	200	practically nontoxic	436781-67 (Gough et al. 1994)	core

These tests indicate that azoxystrobin is practically nontoxic to bees on an acute contact basis. The guideline (141-1) is fulfilled (MRID 436781-66).

Other invertebrates

The studies summarized below were not required but were submitted and reviewed.

Toxicity to earthworms, beetles, and flies

Species	% ai	Toxicity	MRID No. (Author/Year)	Study Classification
Earthworm (*Eisenia foetida*)	96.2	LC50 = 278 mg ai/kg	436781-68 (Fleming et al. 1993)	supplemental[1]
Hoverfly (*Episyrphus balteatus*)	25	no. larvae produced was significantly adversely affected at a test concentration of 0.22 lb ai/acre, the only concentration tested	436781-70 (Coulson et al. 1994)	supplemental[1]
Carabid beetle (*Poecilus cupreus*)	23.7	no adverse affects at test concentration of 0.22 lb ai/acre, the only concentration tested	436781-69 (Yearsdon and Farrelly 1994)	supplemental[1]

[1] not a guideline requirement

The studies are not guideline requirements but provide supplemental information on the toxicity of azoxystrobin to earthworms, flies, and beetles

Freshwater Fish, Acute

Two freshwater fish toxicity studies using the TGAI are required to establish the toxicity of azoxystrobin to fish. The preferred test species are rainbow trout (cold-water species) and bluegill sunfish (warm-water species). Results of these tests are tabulated below.

Freshwater Fish Acute Toxicity

Species	% ai	Test Conditions	96-h LC50 (ppb)	Toxicity Category	MRID No (Author Year)	Study Classification
Rainbow trout (*Oncorhynchus mykiss*)	96.2	flow-through (measured)	470	highly toxic	436781-15 (Craig et al. 1992)	core
Bluegill sunfish (*Lepomis macrochirus*)	96.2	flow-through (measured)	1100	moderately toxic	436781-14 (Sankey et al. 1992)	core

The lowest LC50 value (rainbow trout) is between 0.1 - 10 ppm, which categorizes azoxystrobin as highly toxic to freshwater fish. The guideline (72-1) is fulfilled (MRIDs 436781-14, 436781-15).

Freshwater Fish, Chronic

A freshwater fish early life-stage test using the TGAI is required for azoxystrobin, because active ingredient may be transported to water from the proposed use sites, the rainbow trout LC50 (0.47 ppm) is less than 1 mg/l, and peak aquatic EECs for all uses except almonds exceed 0.01 of the fish LC50 (0.01 x 470 ppb = 4.7 ppb). The preferred test species is the rainbow trout. Results of chronic testing are tabulated below.

Freshwater Fish Early Life-Stage Toxicity

Species	% ai	Test Conditions	NOEC LOEC (ppb)	MATC (ppb)	Endpoints Affected	MRID No. (Author Year)	Study Classification
Fathead minnow (*Pimephales promelas*)	96.2	flow-through (measured)	NOEC = 147 LOEC = 193	168	length	436781-20 (Rhodes et al. 1994)	core

the geometric mean of the NOEC and LOEC

An MATC of 168 ppb is indicated, based on significant adverse effects on growth of newly hatched minnows. The guideline (72-4a) is fulfilled (MRID 436781-20).

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Freshwater Invertebrates, Acute

A test using the TGAI is required to establish the toxicity of azoxystrobin to freshwater aquatic invertebrates. The preferred test species is the water flea (*Daphnia magna)*. Test results are tabulated below.

Freshwater Invertebrate Acute Toxicity

Species	% ai	Test Conditions	48-h EC50 (ppb)	Toxicity Category	MRID No. (Author Year)	Study Classification
Water flea (*Daphnia magna*)	96.2	static (measured)	259	highly toxic	436781-16 (Rapley et al. 1994)	core

Because the EC50 is between 0.1 - 1 ppm, azoxystrobin is categorized as highly toxic to aquatic invertebrates on an acute basis. The guideline (72-2) is fulfilled (MRID 436781-16).

Freshwater Invertebrates, Chronic

A freshwater aquatic invertebrate life-cycle test using the TGAI is required for azoxystrobin, because active ingredient may be transported to water from the intended use sites, the daphnid acute EC50 (0.259 ppm) is less than 1 mg/l, and peak aquatic EECs for all uses exceed 0.01 of the daphnid EC50 (0.01 x 259 ppb = 2.6 ppb) . The preferred test species is the water flea *(Daphnia magna)*. Results of this test are tabulated below.

Freshwater Aquatic Invertebrate Life-Cycle Toxicity

Species	% ai	Test Conditions	21-day NOEC/LOEC (ppb)	MATC[1] (ppb)	Endpoint Affected	MRID No. (Author/Year)	Study Classification
Water flea (*Daphnia magna*)	96.2	static renewal (measured)	NOEC = 44 LOEC = 84	61	no. young produced	436781-21 (Rapley et al. 1994)	core

[1] the geometric mean of the NOEC and LOEC

The tests indicate an MATC of 61 ppb, based on significant adverse effects on the number of young produced by adult daphnids. The guideline (72-4b) is fulfilled (MRID 436781-21).

Estuarine/Marine Fish, Acute

Acute toxicity testing with estuarine/marine fish using the TGAI is required for azoxystrobin, because active ingredient may be transported to the estuarine/marine environment from its proposed use on crops grown in coastal counties. The preferred test species is sheepshead minnow. Results of this test are tabulated below.

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Estuarine/Marine Fish Acute Toxicity

Species	% ai	Test Conditions	96-h LC50 (ppb)	Toxicity Category	MRID No (Author Year)	Study Classification
Sheepshead minnow (*Cyprinodon variegatus*)	96.2	flow-through (measured)	670	highly toxic	436781-17 (Sankey et al. 1992)	core

Because the LC50 is between 0.1 - 1 ppm, azoxystrobin is considered highly toxic to estuarine/marine fish on an acute basis. The guideline (72-3a) is fulfilled (MRID 436781-17).

Estuarine/Marine Invertebrates, Acute

Acute toxicity testing with estuarine/marine invertebrates using the TGAI is required for azoxystrobin, because the active ingredient may be transported to the estuarine/marine environment from its use on crops grown in coastal counties. The preferred test species are mysid shrimp and eastern oyster. Test results are tabulated below.

Estuarine/Marine Invertebrate Acute Toxicity

Species	% ai.	Test Conditions	96-h EC50 LC50 (ppb)	Toxicity Category	MRID No. (Author Year)	Study Classification
Mysid shrimp (*Americamysis bahia*)	96.2	static (measured)	56	very highly toxic	436781-18 (Kent et al. 1993)	core
Pacific oyster (*Crassostrea gigas*) larvae	96.2	static (nominal)	1300	moderately toxic	436781-19 (Kent et al. 1993)	core

The lowest toxicity value (mysid LC50) is <0.1 ppm, which categorizes azoxystrobin as very highly toxic to estuarine/marine invertebrates on an acute basis. The guideline (72-3b and 72-3c) is fulfilled (MRID 436781-18, 436781-19).

Estuarine/Marine Invertebrates, Chronic

An estuarine/marine invertebrate life-cycle test using the TGAI is required for azoxystrobin, because active ingredient may be transported to estuarine/marine waters from its use on crops grown in coastal counties, the mysid shrimp acute EC50 (56 ppb) is less than 1 mg/l, and aquatic EECs are greater than 0.01 of the mysid shrimp acute EC50 (0.01 X 56 ppb = 0.56 ppb). The preferred test species is the mysid shrimp. Test results are tabulated below.

Estuarine/marine Invertebrate Life-Cycle Toxicity

Species	[illegible]	Test Conditions	28-day NOEC LOEC (ppb)	MATC (ppb)	Endpoint Affected	MRID No (Author Year)	Study Classification
Mysid shrimp [illegible] [illegible]	[illegible]	flow-through (measured)	NOEC = 9.5 LOEC = 16	12	survival, reproduction	444523-02 (Boeri et al. 1997)	core

the geometric mean of the NOEC and LOEC

The guideline requirement (74-2b) is fulfilled (MRID 444523-02)

Terrestrial Plants

For pesticides that are not herbicides, terrestrial plant testing is required only on a case-by-case basis (e.g., labeling bears phytotoxicity warnings, incident data or literature indicate phytotoxicity). Data are required for azoxystrobin, because the labeling bears a warning that the product has been shown to be extremely phytotoxic to some apple varieties. The required data include a Tier I/II seedling emergence study and a Tier I/II vegetative vigor study Results of Tier I and Tier II testing are presented in the following three tables

Nontarget Terrestrial Plant Seedling Emergence Toxicity (Tier I)[1]

Species	Endpoint Affected[2]	% Inhibition	MRID No (Author Year)	Study Classification
Monocots				
Corn (*Zea mays*)	dry weight	14.4	436781-56 Canning et al. 1994	core
Meadow fescue (*Festuca pratensis*)	damage	8.6		
Purple nutsedge (*Cyperus rotundus*)	dry weight	5.3		
Winter wheat (*Triticum aestivum*)	dry weight	24.6		
Dicots:				
Carrot (*Daucus carota*)	damage	33.2		
Soybean (*Glycine max*)	damage	10.2		
Cocklebur (*Xanthium strumarium*)	damage	16.1		
Morning glory (*Ipomoea hederacea*)	dry weight	10.1		
Rape (*Brassica napus*)	dry weight	27.2		
Sugar beet (*Beta vulgaris*)	dry weight	11.2		
Velvetleaf (*Abutilon theophrasti*)	dry weight	14.8		

[1] TEP (51.6%) testing at 1 lb ai/A, the maximum application rate

[2] only the most sensitive endpoint has been tabulated for each species

For Tier I seedling emergence, carrot (damage) is the most sensitive dicot and wheat (dry weight) is the most sensitive monocot. Only carrot and rape exceed the trigger (>25% inhibition) for Tier II testing. Tier II testing with those two species are tabulated below.

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Nontarget Terrestrial Plant Seedling Emergence Toxicity (Tier II)

Species	% a.i.	Endpoint Affected[1]	EC25 (lb ai/A)	EC05 (lb ai/A)	MRID No. (Author Year)	Study Classification
Dicots						
Carrot (*Daucus carota*)	51.6	dry weight	59	0.17	436781-60 (Everett et al 1995)	core
Rape (*Brassica napus*)	51.6	emergence	3.2	55		

[1] only the most sensitive endpoint is tabulated

For Tier II seedling emergence, carrot (dry weight) is the most sensitive of the two species tested.

Nontarget Terrestrial Vegetative Vigor Toxicity (Tier I)[1]

Species	Endpoint Affected[2]	% Inhibition	MRID No. (Author Year)	Study Classification
Monocots:				
Corn (*Zea mays*)	dry weight	8.7	436781-58 (Canning et al. 1994)	core
Purple nutsedge (*Cyperus rotundus*)	dry weight	2.9		
Winter wheat (*Triticum aestivum*)	dry weight	4.9		
Wild oat (*Avena fatua*)	dry weight	11.4		
Dicots:				
Soybean (*Glycine max*)	damage	0.3		
Cocklebur (*Xanthium strumarium*)	damage	0.3		
Morning glory (*Ipomoea hederacea*)	damage	0		
Rape (*Brassica napus*)	dry weight	6.7		
Sugar beet (*Beta vulgaris*)	damage	1.3		
Velvetleaf (*Abutilon theophrasti*)	damage	0.7		

[1] TEP (51.6%) testing at 1 lb ai/A, the maximum label rate

[2] only the most sensitive endpoint has been tabulated for each species

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For Tier I vegetative vigor, rape (dry weight) is the most sensitive dicot and wild oat (dry weight) is the most sensitive monocot. Because all species tested were inhibited less than 25%. Tier II testing is not required

Aquatic Plants

Aquatic plant testing is required for any fungicide that has outdoor non-residential terrestrial uses that may result in off-site movement via runoff (i.e., solubility >10 ppm in water) and/or drift (aerial or irrigation) or that is applied directly to aquatic use sites (except residential). These conditions applying to azoxystrobin include aerial application and proposed use on rice. Tier II toxicity test results on the TGAI are tabulated below.

Nontarget Aquatic Plant Toxicity (Tier II)

Species	% ai	EC50 (ppb)	NOEC (ppb)	MRID No. (Author Year)	Study Classification
Vascular Plants:					
Duckweed (*Lemna gibba*)	96.2	3400	800	436781-65 (Smyth et al. 1993)	core
Nonvascular Plants:					
Green algae (*Kirchneria subcapitata*)	96.2	100	20[1]	436781-61 (Smyth et al. 1994)	core
Marine diatom (*Skeletonema costatum*)	96.2	500	100	436781-63 (Smyth et al. 1993)	core
Freshwater diatom (*Navicula pelliculosa*)	96.2	500	20	436781-64 (Smyth et al. 1994)	core
Blue-green algae (*Anabaena flos-aquae*)	96.2	13,000	9000	436781-62 (Smyth et al. 1993)	core

[1] the EC05 value is tabulated, because an NOEC was not determined

Tier II results indicate that the green algae *Kirchneria subcapitata* is the most sensitive aquatic plant. The guideline (123-2) is fulfilled (MRIDs 436781-61, 436781-62, 436781-63, 436781-64, 436781-65).

Ecological Risk Assessment

EFED compares risk quotients (RQs) to levels of concern (LOCs) to assess the potential for adverse ecological effects. RQs are determined by comparing estimated environmental concentrations (EECs) with ecotoxicity values, where

RQ = EEC / TOXICITY

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Risk presumptions are made by comparing acute and chronic RQs to the LOCs for birds, mammals, plants, and aquatic organisms. Exceedance of an LOC indicates the potential for serious risk to nontarget organisms and the need for the Agency to consider regulatory action. LOCs are used to address the following risk presumption categories: (1) **acute high risk** - regulatory action may be warranted to eliminate or reduce risk, (2) **acute restricted use** - risk may be mitigated by restricted use classification; (3) **acute endangered species** - regulatory action may be warranted to protect endangered species, and (4) **chronic risk** - regulatory action may be warranted to eliminate or reduce chronic risk.

The ecotoxicity values for acute effects are: (1) LC50 (fish, birds); (2) LD50 (birds, mammals); (3) EC50 (aquatic plants, aquatic invertebrates); and (4) EC25 (terrestrial plants). Ecotoxicity values for chronic effects are (1) LOEC (birds, fish, aquatic invertebrates); (2) NOEC (birds, mammals, fish, aquatic invertebrates); and (3) MATC (fish, aquatic invertebrates). The MATC (geometric mean of the NOEC and LOEC) is generally used for assessing chronic effects to fish and aquatic invertebrates, but the NOEC may be used if the measurement endpoint is survival or production of offspring.

Risk presumptions are tabulated below.

Risk Presumptions for Birds and Mammals

Risk Presumption	RQ	LOC
Acute High Risk	EEC[1]/LC50 or LD50/sqft[2] or LD50/day[3]	0.5
Acute Restricted Use	**EEC/LC50 or LD50/sqft or LD50/day (or LD50 < 50 mg/kg)**	**0.2**
Acute Endangered Species	EEC/LC50 or LD50/sqft or LD50/day	0.1
Chronic Risk	EEC/NOEC	1

[1] EEC = Estimated Environmental Concentration (ppm) on avian and mammalian food items
[2] mg toxicant/ft^2 ÷ [LD50 * bird wt (kg)]
[3] mg toxicant consumed/day ÷ [LD50 * bird wt (kg)]

Risk Presumptions for Aquatic Animals

Risk Presumption	RQ	LOC
Acute High Risk	EEC[1]/LC50 or EC50	0.5
Acute Restricted Use	EEC/LC50 or EC50	0.1
Acute Endangered Species	EEC/LC50 or EC50	0.05
Chronic Risk	EEC/MATC or NOEC	1

[1] EEC = Estimated Environmental Concentration (ppm or ppb) in water

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Risk Presumptions for Plants

Risk Presumption	RQ	LOC
Terrestrial:		
Acute Risk	EEC[1]/EC25	1
Endangered Species	EEC/EC05 or NOEC	1
Aquatic:		
Acute Risk	EEC[2]/EC50	1
Endangered Species	EEC/EC05 or NOEC	1

[1] EEC = Estimated Environmental Concentration (lb ai/A)
[2] EEC = Estimated Environmental Concentration (ppb/ppm) in water

Birds, acute and chronic risks

Based on expected low EECs on potential food items and azoxystrobin's lack of acute toxicity to birds, minimal acute risk is expected from any of the proposed new uses (almonds, tree nuts, plantains, Christmas trees, muscadines, pistachios, rice, cucurbits, roses, wheat). Azoxystrobin is practically nontoxic to birds (LC50s >5200 ppm), and the peak EEC is not expected to exceed 335 ppm for the highest exposure scenario (0.25 lb ai/A, 6 appl. at 7-day intervals; maximum EEC on short grass).

Chronic RQs are presented below for the proposed new use sites with the highest application rates.

Avian Chronic Risk Quotients, Based on the Mallard and Northern Bobwhite NOEC of 1200 ppm and Averaged EECs

Site[1]	Appl. Rate (lbs ai/A)	No. Appl	Food Item	Avg. Max. EEC (ppm)	Chronic RQ (EEC/NOEC)
Cucurbits, almonds, Christmas trees, Roses	0.25	6	short grass	217	0.2
			broadleaf plants and Insects	122	0.1
			seeds	14	<0.1

[1] Only the proposed use sites with the highest EECs resulting from multiple applications are tabulated

The chronic LOC (RQ ≥1) is not exceeded for the proposed new use sites with the highest application rates and thus would not be exceeded for use sites with lower application rates. Therefore, minimal chronic risk to birds is presumed.

Mammals, acute and chronic risks

Minimal acute risk to mammals is expected from any use site. Azoxystrobin is practically nontoxic to mammals (LD50 >5000 mg ai/kg), and the maximum EEC on short grass is not expected to exceed 335 ppm for the highest exposure scenario. A 15 g herbivore consuming 14 g of food per day would ingest only about 0.36 mg ai/kg body weight if feeding exclusively on contaminated short grass.

The chronic RQ is determined by comparing the "FATE"-derived EEC for chronic exposure to the NOEC indicated by the two-generation rat reproductive toxicity test submitted to the Agency's Health Effects Division. The chronic RQ is tabulated below.

Mammalian Chronic RQs, Based on the Lab. Rat NOEC of 300 ppm and Average EECs

Site	Appl. Rate (lb ai A)	No. Appl.	Food Item	Avg. Max. EEC (ppm)	Chronic RQ (EEC/NOEC)
Cucurbits, Almonds, Christmas trees, Roses	0.25	6	short grass	217	0.7
			broadleaf plants insects	122	0.4
			seeds	14	<0.1

The mammalian chronic risk LOC (RQ ≥1) is not exceeded for any of the proposed new uses. Minimal chronic risk is expected.

Insects

EFED does not assess risk to nontarget insects. Toxicity results are used for recommending appropriate label precautions. Because azoxystrobin is practically nontoxic to the honey bee, precautionary labeling is not required.

Freshwater Fish, acute and chronic risks

Acute and chronic RQs are tabulated below.

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Risk Quotients for Freshwater Fish, Based On a Rainbow Trout LC50 of 470 ppb and a Fathead Minnow MATC of 168 ppb

Site	Appl. Rate lbs ai/A	No. Appl	Peak EEC (ppb)	56- or 60-day avg. EEC (ppb)	Acute RQ (EEC/LC50)	Chronic RQ (EEC/MATC)
			PRZM2 EXAM II			
Cucurbits	0.25	6	32	28	0.07 *	0.2
Peanuts	0.4	2	11	10	0.02	0.1
Grapes, Almonds	0.25	6	5	4	0.01	0.1
			GENEEC			
Turf	0.55	9	141	127	0.30 **	0.8
Rice	0.25	3	117	95	0.25 **	0.6
Roses, Christmas trees	0.25	6	46	42	0.10 **	0.3
Pecans, Pistachios, Tree nuts, Peaches	0.15-0.20	6-8	37	33	0.08 *	0.2
Tomatoes, Bananas and Plantains	0.1-0.135	8	31	28	0.07 *	0.2
Wheat	0.2	2	13	12	0.03	0.1

*** exceeds the LOCs for high risk (RQ ≥0.5), restricted use (RQ ≥0.1), and endangered species (RQ ≥0.05)
** exceeds the LOCs for restricted use and endangered species
* exceeds the LOC for endangered species

Based on the RQs, acute high risk to fish is not presumed for any use, but the restricted use LOC is exceeded for turf, rice, Christmas trees, and roses. Acute risk to endangered species is presumed for all use sites except peanuts, grapes, almonds, and wheat.

The chronic risk LOC (RQ ≥1) is not exceeded for any use site.

Freshwater Invertebrates, acute and chronic risks

The acute and chronic RQs are tabulated below.

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Risk Quotients for Freshwater Invertebrates, Based On the Daphnid EC50 of 259 ppb and NOEC of 44 ppb

Site	Appl. Rate lb ai/A	No. Appl	Peak EEC (ppb)	21-day-avg EEC (ppb)	Acute RQ (EEC/LC50)	Chronic RQ (EEC/NOEC)
			PRZM2/EXAM II			
Cucurbits	25	6	32	30	0.11 **	0.7
Peanuts	4	2	11	10	0.04	0.2
Grapes, Almonds	25	6	5	5	0.02	0.1
			GENEEC			
Turf	55	9	141	135	0.54 ***	3.1 ‡
Rice	0.25	3	117	108	0.45 **	2.5 ‡
Christmas trees, Roses	0.25	6	46	44	0.18 **	1.1 ‡
Pecans, Pistachios Tree nuts, Peaches	0.15-0.20	6-8	37	36	0.14 **	0.8
Tomatoes, Bananas and Plantains	0.135	8	31	29	0.12 **	0.7
Wheat	0.2	2	13	13	0.05 *	0.3

*** exceeds the LOCs for high risk (RQ _0.5), restricted use (RQ _0.1), and endangered species (RQ _0.05)
** exceeds the LOCs for restricted use and endangered species
* exceeds the LOC for endangered species
‡ exceeds the LOC (RQ _1) for chronic risk

Acute high risk to freshwater invertebrates is presumed for turf. The restricted use LOC is exceeded for all uses except peanuts, grapes, almonds, and wheat. Risk to endangered species, except freshwater mussels, is presumed for all uses except peanuts, grapes, and almonds. For predicting toxicity to freshwater mussels, oysters have been found to be more representative than daphnids. Using the oyster EC50 of 1300 ppb and peak EEC of 141 ppb for turf and 117 ppb for rice, RQs = 0.11 and 0.09, respectively. Based on these estimates, risk to endangered mussels is presumed only for turf and rice.

Chronic risk is presumed for turf, rice, Christmas trees, and roses.

Estuarine/Marine Fish, acute risk

Acute RQs are tabulated below for use sites from which runoff and drift might contaminate the estuarine/marine environment.

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Acute Risk Quotients for Estuarine/Marine Fish, Based on a Sheepshead Minnow LC50 of 670 ppb

Site	Appl. Rate (lb ai/A)	No. Applications	Peak EEC (ppb)	Acute RQ (EEC/LC50)
		PRZM2 EXAM II		
Peanuts	4	2	11	0.02
		GENEEC		
Turf	.55	9	141	0.21 **
Rice	0.25	3	117	0.17 **
Tomatoes	[illegible]	8	25	0.04

*** exceeds the LOCs for high risk (RQ _0.5), restricted use (RQ _0.1), and endangered species (RQ _0.05)
** exceeds the LOCs for restricted use and endangered species

Acute high risk to estuarine marine fish is not presumed for any use, but restricted use and endangered species LOCs are exceeded for turf and rice grown in coastal counties. Because the EECs are derived from GENEEC (based on runoff and drift into a 1-ha, 2-m deep farm pond), some uncertainty exists in applying them to estuarine/marine waters.

Estuarine/Marine Invertebrates, acute and chronic risks

Acute and chronic RQs are tabulated below for use sites that might contaminate the estuarine/marine environment..

Acute and Chronic Risk Quotients for Estuarine/Marine Aquatic Invertebrates, Based on a Mysid Shrimp LC50 of 56 ppb and a NOEC 0f 9.5 ppb

Site	Appl. Rate lb ai/A	No. Appl.	Peak EEC (ppb)	21-day-avg EEC (ppb)	Acute RQ (EEC/LC50)	Chronic RQ (EEC/NOEC)
			PRZM2/EXAM II			
Peanuts	4	2	11.3	30	0.20 **	3.2 ‡
			GENEEC			
Turf	.55	9	141	135	2.52 ***	14.2 ‡
Rice	.25	3	117	108	2.09 ***	11.4 ‡
Tomatoes	[illegible]	8	25	29	0.45 **	3.1 ‡

*** exceeds the LOCs for high risk (RQ _0.5), restricted use (RQ _0.1), and endangered species (RQ _0.05)
** exceeds the LOCs for restricted use and endangered species
‡ exceeds the LOC (RQ _1) for chronic risk

Based on the RQs, acute high risk to estuarine/marine invertebrates is presumed for turf and rice in coastal counties. Restricted use, endangered species, and chronic risk LOCs are exceeded for all uses that might contaminate estuarine waters. Because the EECs are derived

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from GENEEC (based on runoff and drift into a 1-ha, 2-m deep farm pond), some uncertainty exists in applying them to estuarine/marine waters. The uncertainty is likely to be greater for chronic exposure, especially in situations where significant tidal flushing occurs.

Terrestrial Plants

RQs for endangered and non-endangered terrestrial plants inhabiting dry and semi-aquatic areas are tabulated below. Formulas for terrestrial plant exposure calculations are attached.

Risk Quotients for Terrestrial Plants, Based On a Carrot Seedling Emergence EC25 of 0.59 lb ai/A and an EC05 of 0.17 lb ai/A

Site[1]	Appl rate (lb ai/A) No. Appl.	Total Loading to Adjacent Dry Area (Sheet Runoff + Drift) (lb ai/A)	Total Loading to Semi-aquatic Area (Channelized Runoff + Drift) (lb ai/A)	Dry Areas		Semi-Aquatic Areas	
				Non-endang. species RQ	Endangered species RQ	Non-endang. species RQ	Endangered species RQ
Turf	0.55 (9)	0.245	0.528	0.4	1.4	0.9	3.1
Grapes and muscadines, Cucurbits, Almonds, Christmas trees, Roses	1.5 (6)	0.[illegible]14	0.031	0.1	0.1	0.1	0.2

[1] only the use sites with the highest annual application rates are tabulated
* exceeds the LOC (RQ ≥1) for endangered terrestrial plants

No risk is presumed for non-endangered plants inhabiting either adjacent dry areas or semi-aquatic areas receiving channelized runoff from treated sites. However, the endangered species LOC is exceeded both for dry and semi-aquatic areas associated with turf.

Aquatic Plants

Risk to aquatic vascular plants is based on the EC50 for duckweed *(Lemna gibba)*, whereas risk to nonvascular aquatic plants is based on the most sensitive EC50 for an algae or diatom species. An aquatic plant risk assessment for acute endangered species is made for aquatic vascular plants is based on the duckweed NOEC, no nonvascular aquatic plants are listed. EECs are based on GENEEC. RQs for vascular and nonvascular plants are tabulated below.

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Risk Quotients for Aquatic Plants, Based on the Duckweed EC50 of 3400 ppb and NOEC of 800 ppb and the Green Algae EC50 of 100 ppb

Site	Appl. Rate (lb ai/A)	No. Appl	Species	Peak EEC (ppb)	Acute RQ (EEC/EC50)	End. Spp. RQ (EEC/NOEC)
			PRZM2 EXAMS II			
[illegible]	0.25	6	duckweed algae	31	0.1 0.3	0.1
Peanuts	0.4	2	duckweed algae	11	0.1 0.1	0.1
Grapes, Almonds	0.25	6	duckweed algae	5	0.1 0.1	0.1
			GENEEC			
Turf	0.55	9	duckweed algae	141	0.1 1.4 *	0.2
Rice	0.25	3	duckweed algae	117	0.1 1.2 *	0.1
Christmas trees, Roses	0.25	6	duckweed algae	46	0.1 0.5	0.1
Pecans, Pistachios, Tree nuts, Peaches	0.15-0.2[illegible]	6-8	duckweed algae	37	0.1 0.4	0.1
Tomatoes, Bananas and Plantains	0.135	8	duckweed algae	31	<0.1 0.3	<0.1
Wheat	0.2	2	duckweed algae	13	<0.1 0.1	<0.1

* exceeds the LOC (RQ ≥1) for non-vascular aquatic plants

Risk to aquatic plants is presumed only for non-vascular plants associated with surface waters receiving runoff and drift from turf and rice. Minimal risk is expected for non-endangered and endangered vascular aquatic plants.

Endangered Species

Risk to endangered species is presumed for the organisms and use sites tabulated below.

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Risk Presumptions for Endangered Species

Organisms	Sites for Which Risk is Presumed
Freshwater fish	Turf, Rice, Roses, Christmas trees, Pecans, Pistachios, Tree nuts, Peaches, Cucurbits, Tomatoes, Bananas and Plantains
Freshwater invertebrates (other than mussels)	Turf, Rice, Roses, Christmas trees, Pecans, Pistachios, Tree nuts, Peaches, Cucurbits, Tomatoes, Bananas and Plantains, Wheat
Freshwater mussels	Turf, Rice
Estuarine/marine fish	Turf and Rice in coastal counties
Terrestrial plants	Turf

The endangered species LOC also was exceeded for estuarine/marine invertebrates, but there are no federally listed species. Endangered species concerns should be addressed via the Endangered Species Task Force.

References

Fletcher, J.S., J.E. Nellessen, and T.G. Pfleeger 1994. Literature review and evaluation of the EPA food-chain (Kenaga) nomogram, an instrument for estimating pesticide residues on plants. Environ. Toxicol. Chem. 13:1383-1391.

Hoerger, F. and E.E. Kenaga. 1972. Pesticide residues on plants: correlation of representative data as a basis for estimation of their magnitude in the environment. In F. Coulston and F. Korte (eds), Environmental Quality and Safety: Chemistry, Toxicology and Technology. Georg Thieme Publishers, Stuttgart, pp. 9-28.

Appendix I - Terrestrial Plant Exposure Formulas

The formulas are for a single application. EFED's "FATE" program is then used to estimate maximum loading from multiple applications, with the degradation rate based on the soil metabolism half-life value.

<u>EECs for Terrestrial Plants Inhabiting Dry Areas Adjacent to Treatment Sites</u>

Ground application (unincorporated):
Runoff = maximum application rate (lb ai/A) x runoff value (1%, 2%, or 5%)
Drift = maximum application rate (lb ai/A) x 1% (drift)
Total Loading = runoff (lb ai/acre) + drift (lb ai/A)

Aerial or airblast application:
Runoff = max. appl. rate (lb ai/A) x 75% (application efficiency) x runoff value
Drift = max. appl. rate (lb ai/A) x 5% (drift)
Total Loading = runoff (lb ai/A) + drift (lb ai/A)

<u>EECs for Terrestrial Plants Inhabiting Semi-aquatic Areas</u>

Ground application (unincorporated):
Runoff = max. appl. rate (lb ai/A) x runoff value x 10 acres
Drift = max. appl. rate x 1%
Total Loading = runoff (lb ai/A) + drift (lb ai/A)

Aerial or airblast application:
Runoff = max. appl. rate (lb ai/acre) x 75% x runoff value x 10 acres
Drift = max. appl. rate (lbs ai/A) x 0.05
Total Loading = runoff (lb ai/A) + drift (lb ai/A)

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Appendix II - SCI-GROW (Screening Concentration In GROund Water)

The SCI-GROW screening model developed in EFED is an empirical model, which is based upon actual groundwater monitoring data collected for the registration of a number of pesticides that serves as benchmarks for the model. The current version of SCI-GROW appears to provide conservative estimates of peak pesticide concentrations over a 90-day period in shallow, highly vulnerable ground water sites (i.e., sites with sandy soils and depth to ground water of 10 to 20 feet). There may be exceptional circumstances under which ground water concentrations could exceed SCI-GROW estimates, however these circumstances are rare, as SCI-GROW model is based on worst-case conditions. It should be also noted that, since there is relatively little temporal variation in ground water, SCI-GROW concentrations could be used as acute and chronic values.

EFED reported SCI-GROW on turf as a representation of a worst-case scenario for ground water contamination from azoxystrobin use. The input parameters and results listed below were based on the "SWAT Team Second Interim Report", R. David Jones/Denise Keehner, June 20, 1997.

Inputs parameters:

Parameter	**Range**	**Value Used**	**Source**
Aerobic Soil Metabolism $t_{1/2}$	72 to 164 days	[1] not used. See Field Dissipation $t_{1/2}$	MRID 43678175
Field Dissipation $t_{1/2}$	8 to 24 days	16 day (median)	MRID 43678183/184/185
K_{ad}	1.5 to 23 mL/g	see K_{oc} values	MRID 43678178
K_{oc}	210 to 1690 mL/g	1690 mL/g	MRID 43678178 / 43678181

[1]. Because azoxystrobin is a fungicide which will generally contact foliage first, and is relatively immobile in soil, the median half-life value was taken from field dissipation studies (this value corresponded with soil photodegradation half lives).

Ground Water Concentrations (ppb or μg/L):

Crop	**Application Rate (lb. ai/A)**	**No. of Applications**	**Application Intervals**	**Ground Water Concentration (ppb)**
Turf	0.55	9	10	0.06

Appendix III - GENEEC (GENeric Expected Environmental Concentration)

The EFED GENEEC model (version 1.2) is used to estimate pesticide concentrations in a 1-hectare by 2-meter deep pond with no outlet draining an adjacent 10-hectare field. It provides an upper-bound screening concentration value for most types of surface water for up to 56-days after runoff. GENEEC is a single runoff event but accounts for spray drift from single or multiple applications. The pond receives a pesticide load from spray drift for each application plus loading from a single runoff event, in this case, two days after the last application. The runoff event transports a maximum of 10% of the pesticide remaining in the top 2.5-cm of soil. This amount can be reduced through soil adsorption. The amount of pesticide remaining on the field in the top 2.5-cm of soil depends on the application rate, the number of applications, the interval between applications, the incorporation depth, and the degradation rate in the soil. Spray drift is determined by method of application (5% drift for aerial spray and airblast, 1% for ground spray). Note that new labels allow both aerial and ground application for all uses of azoxystrobin. Therefore new EECs (Estimated Environmental Concentrations) for aerial are generated to supplement the ground values previously reported in the SWAT Team report. Minimal difference in EECs are noted between the two modes of application.

Input Parameter:

Parameter	**Range**	**Value Used**	**Source**
Solubility (water)	6.7 mg/L	6.7 mg/L	EFGWB One-Liner
Hydrolysis $t_{1/2}$	stable at pH 7	0 day	MRID 43678172
Aquatic Photolysis $t_{1/2}$	11 to 17 days	14 days (average)	MRID 43678173
Aerobic Soil Metabolism $t_{1/2}$	72 to 164 days	164 days	MRID 43678175
Aerobic Aquatic Metabolism $t_{1/2}$	stable	(0 day)	No data available
K_{ad}	1.5 to 23 mL/g	see K_{oc} values	MRID 43678178
K_{oc}	210 to 1690 mL/g	210 mL/g	MRID 43678178 / 43678181

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EECs (ppb or μg/L)- Ground Application [1]:

Crops	Applicat Rate (lb ai/A)	No. of Appl.	Appl. Interv.	Initial EEC (ppb)	21-day EEC (ppb)	56-60-day EEC (ppb)
Wheat	0.20	2	10	13	12	11
Tomatoes	0.10	5	5	24	23	23
Bananas	0.135	8	12	29	28	26
Peaches	0.15	8	10	33	32	30
Pecans	0.20	6	14	33	32	30
Peanuts	0.40	2	30	24	23	22
Grapes	0.25	6	10	43	42	39

[1]- Data taken from the "SWAT TEAM Second Interim Report". R.David Jones/Denise Keehner, June 20, 1997

EECs (ppb or μg/L)- Aerial Application:

Crops	Applicat Rate (lb ai/A)	No. of Appl.	Appl. Interv.	Initial EEC (ppb)	21-day EEC (ppb)	56-60-day EEC (ppb)
Wheat	0.20	2	10	13	13	12
Bananas [2]	0.10-0.135	8	5-12	31	29	28
Pecans [3]	0.15-0.20	6-8	7	[illegible]	[illegible]	33
Peanuts	0.40	2	30	26	25	24
Grapes [4]	0.25	6	7-10	46	44	42
Turf	0.55	9	10	141	135	127

[2] - includes Bananas and Plantains. Tomatoes
[3] - includes Pecans. Pistachios. Tree Nuts. Peaches
[4] - includes Grapes and Muscadines. Cucurbits. Almonds. Christmas Trees. Roses

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Appendix IV - Azoxystrobin on RICE

Label Rate = 3 applications - 7 days apart @ 0.25, 0.25 and 0.20 (total 0.70) lbs ac

Assume K_{oc} = 210, therefore dissolved = 57.1 % based upon GENEEC

Assume Field Half-life = 164 DAYS
Therefore effective Rate Constant, K = 0.00423 day

Assume direct application to paddy water depth of 10 centimeters

Concentration in field water after final application = 0.435 ppm (435 ppb

Assume water stays in field for 15 days prior to drainage to an off-site water body containing the same volume of water as the paddy

Concentration in this waterbody after inflow of drainage water from paddy and binding = 117 ppb

ACUTE 1 DAY EEC IN WATERBODY = 117 ppb
AVERAGE 4 DAY EEC = 115 ppb
AVERAGE 21 DAY EEC = 108 ppb
AVERAGE 56 DAY EEC = 95 ppb

Appendix V - PRZM /EXAMS

The PRZM (Pesticide Root Zone Model; version 3.1) program simulates pesticides in field runoff on daily time steps, incorporating runoff, infiltration, erosion, and evapotranspiration. The model calculates foliar dissipation and runoff, pesticide uptake by plants, microbial transformation, volatilization, and soil dispersion and retardation. The EXAMS (Exposure Analysis Modeling Systems, version 2.97.5) program simulates pesticide fate and transport in an aquatic environment (one hectare body of water, two meters deep, draining an adjacent 10 hectare agriculture field). The weather and agricultural practice are simulated at the site over multiple (usually 36) years so that the probability of EECs occurring at that site can be estimated.

Input Parameters for PRZM/EXAMS

Parameter	Range	Value Used	Source
Aerobic Soil Metabolism $t_{1/2}$	72 to 164 days	164	MRID 43678175
K_{oc}	210 to 1690 mL/g	540 (median)	MRID 43678178 / 43678181
Molecular Weight	403.4 g/mole	403	EFGWB One-Liner
Aqueous Solubility	6.7 mg/L	6.7	EFGWB One-Liner
Vapor Pressure	8.2×10^{-13} mm Hg @ 20°C	8.2×10^{-13}	EFGWB One-Liner
Biolysis rate Constant in Water Column	**8.81×10^{-5} /(cfu/mL)/hr**	**8.81×10^{-5}**	**half of the aerobic soil decay rate**
Biolysis rate Constant in Benthic layer	5.16×10^{-4} /(cfu/mL)/hr	5.16×10^{-4}	half of the anaerobic soil decay rate
Direct Photolysis Rate	1.7×10^{-3} /hr	1.7×10^{-3}	

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Input Summary for Tier 2 Aquatic Exposure Assessment of Azoxystrobin Uses

PRZM (version 3.1) 02-05-98, 1,206,449 bytes

Crop - **Peanuts**

Meteorology file - MET133A.MET 03-22-91, 775,790 bytes
Region - MLRA (Major Land Resource Area) 133A: Southern Coastal Plain
Soil - Cowarts Sandy Loam (Hydrological Soil Group - HSG: C)
Application scheme - Aerial - 2 @ 0.40 lb ai/ac w/ 10-day interval
Soil aerobic half-life - 164 days
Foliar half-life - 0 days (no data)
Koc- 540 L/kg

Crop - **Grapes**

Meteorology file - MET17.MET 08-11-92, 775,791 bytes
Region - MLRA (Major Land Resource Area) 17: Sacramento and San Joaquin Valleys
Soil - Tehama Silt Loam (Hydrological Soil Group - HSG: C)
Application scheme - Aerial - 6 @ 0.25 lb ai/ac w/ 10-day interval
Soil aerobic half-life - 164 days
Foliar half-life - 0 days (no data)
Koc- 540 L/kg

Crop - **Almond**

Meteorology file - MET17.MET 08-11-92, 775,791 bytes
Region - MLRA (Major Land Resource Area) 17: Sacramento and San Joaquin Valleys
Soil - Kimberlina Sandy Loam (Hydrological Soil Group - HSG: B)
Application scheme - Airblast - 6 @ 0.25 lb ai/ac w/ 10-day interval
Soil aerobic half-life - 164 days
Foliar half-life - 0 days (no data)
Koc- 540 L/kg

Crop - **Cucurbits**

Meteorology file - MET156B.MET 08-13-92, 775,791 bytes
Region - MLRA (Major Land Resource Area) 156B: Southern Florida Lowlands
Soil - Riviera Sand (Hydrological Soil Group - HSG: C)
Application scheme - Aerial - 6 @ 0.25 lb ai/ac w/ 7-day interval
Soil aerobic half-life - 164 days
Foliar half-life - 0 days (no data)
Koc- 540 L/kg

EXAMS (version 2.97.5) 06-13-97. 2,248,357 bytes

Environment file - MSPOND DAT 10-08-97. 8 233 bytes

Chemical Inputs -

variable	description	value	unit
MWT	Molecular Weight	4.03E+2	g/mole
SOL	Aqueous Solubility	6 70	mg L
VAPR	Vapor Pressure	8.20E-13	mm Hg
KOC	Partition Coefficient Based on O C.	5.40E+2	L/kg
KBACW	Biolysis Rate Constant in Water Column	8.81E-5	/(cfu mL) hr
KBACS	Biolysis Rate Constant in Benthic Layer	5.16E-4	/(cfu mL) hr
KDP	Direct Photolysis Rate	1 70E-3	/hr

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EEC Summaries

Peanuts Use - Upper tenth percentile EECs in ppb:

Peak	96-hour	21-day	60-day	90-day	yearly
11.334	11.[illegible]76	10.271	9.482	8.746	4.134

Loading Contributions in percent

Runoff	Erosion	Spray Drift
69.87	0.94	29.19

Grapes Use - Upper tenth percentile EECs in ppb.

Peak	96-hour	21-day	60-day	90-day	yearly
4.957	4.875	4.586	4.176	3.897	2.675

Loading Contributions in percent:

Runoff	Erosion	Spray Drift
16.09	0.22	83.69

Almond Use - Upper tenth percentile EECs in ppb:

Peak	96-hour	21-day	60-day	90-day	yearly
4.151	4.074	3.789	3.484	3.256	2.103

Loading Contributions in percent:

Runoff	Erosion	Spray Drift
9.30	0.00	90.70

Cucurbits Use - Upper tenth percentile EECs in ppb:

Peak	96-hour	21-day	60-day	90-day	yearly
31.953	31.272	30.045	27.831	25.661	13.521

Loading Contributions in percent:

Runoff	Erosion	Spray Drift
76.43	5.52	18.05

Azoxystrobin - Peanuts - MLRA 133A

WATER COLUMN DISSOLVED CONCENTRATION PPB

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	5.956	5.818	5.311	4.575	4.225	1.491
1949	2.917	2.856	2.691	2.466	2.337	1.729
1950	13.420	13.110	12.000	11.000	10.140	3.685
1951	8.096	7.928	7.304	6.270	5.736	4.013
1952	3.844	3.797	3.606	3.222	2.966	2.199
1953	21.550	20.160	18.260	15.350	13.840	4.436
1954	9.353	9.133	8.755	7.803	7.178	4.352
1955	2.712	2.655	2.442	2.092	1.924	1.444
1956	7.085	6.899	6.449	5.517	4.973	1.960
1957	7.193	7.073	6.867	6.271	5.736	3.080
1958	5.187	5.081	4.695	4.083	3.721	2.489
1959	4.747	4.655	4.291	3.910	3.607	2.086
1960	6.484	6.371	6.119	5.440	4.967	2.523
1961	16.940	16.600	15.090	12.880	11.580	4.687
1962	6.675	6.594	6.265	5.600	5.157	3.897
1963	7.888	7.718	7.125	6.077	5.708	2.973
1964	10.150	9.953	9.277	8.831	8.148	4.041
1965	5.776	5.674	5.286	4.960	4.758	3.485
1966	8.929	8.734	8.179	7.456	6.823	3.174
1967	5.100	4.999	4.656	4.167	3.856	2.786
1968	3.665	3.622	3.396	2.991	2.775	1.789
1969	9.548	9.335	8.668	7.390	6.658	2.904
1970	4.373	4.318	4.100	3.660	3.368	2.521
1971	10.440	10.200	9.530	8.322	7.513	2.959
1972	5.738	5.614	5.156	4.407	4.045	2.888
1973	4.166	4.092	3.769	3.273	3.042	1.884
1974	8.698	8.548	7.847	7.102	6.496	2.875
1975	7.580	7.421	6.959	6.010	5.548	3.138
1976	5.969	5.840	5.363	4.569	4.148	2.601
1977	6.803	6.682	6.193	5.310	4.912	2.445
1978	3.696	3.624	3.356	2.919	3.016	2.129
1979	3.477	3.411	3.164	2.793	2.696	1.923
1980	4.772	4.670	4.294	3.928	3.628	1.755
1981	3.719	3.647	3.379	3.209	3.015	1.948
1982	9.969	9.761	8.989	7.888	7.458	3.182
1983	5.375	5.271	4.883	4.385	4.099	3.120
1/10	11.334	11.076	10.271	9.482	8.746	4.134

MEAN OF ANNUAL VALUES = 2.791

STANDARD DEVIATION OF ANNUAL VALUES = .868

UPPER 90 CONFIDENCE LIMIT ON MEAN = 3.005

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Azoxystrobin - Grapes - MRLA 17

WATER COLUMN DISSOLVED CONCENTRATION (PPB

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	3.256	3.181	2.943	2.636	2.444	1.247
1949	3.581	3.511	3.249	2.944	2.728	1.500
1950	3.717	3.645	3.377	3.073	2.855	1.681
1951	3.673	3.602	3.335	3.031	2.814	1.627
1952	3.809	3.735	3.461	3.159	2.939	1.958
1953	3.977	3.903	3.622	3.319	3.096	2.071
1954	4.143	4.066	3.780	3.476	3.249	2.259
1955	3.832	3.759	3.485	3.181	2.961	1.846
1956	6.207	6.079	5.603	4.795	4.302	2.246
1957	4.195	4.118	3.833	3.526	3.298	2.379
1958	4.293	4.223	3.920	3.606	3.377	2.051
1959	3.697	3.626	3.358	3.054	2.836	1.670
1960	9.093	8.893	8.194	6.802	5.232	2.684
1961	5.545	5.467	5.157	4.565	4.186	3.245
1962	4.563	4.482	4.200	3.875	3.639	2.671
1963	4.705	4.622	4.341	4.009	3.773	2.789
1964	3.751	3.679	3.409	3.105	2.886	1.746
1965	3.728	3.656	3.387	3.083	2.864	1.678
1966	4.100	4.024	3.737	3.436	3.209	2.308
1967	3.982	3.907	3.626	3.324	3.100	2.067
1968	3.353	3.288	3.042	2.731	2.537	1.579
1969	3.613	3.542	3.279	2.974	2.758	1.531
1970	3.621	3.551	3.287	2.982	2.766	1.559
1971	3.622	3.552	3.288	2.983	2.767	1.555
1972	3.620	3.550	3.286	2.981	2.765	1.559
1973	3.622	3.552	3.288	2.983	2.767	1.558
1974	3.623	3.552	3.288	2.983	2.767	1.564
1975	3.623	3.552	3.288	2.983	2.767	1.560
1976	3.620	3.550	3.286	2.981	2.765	1.556
1977	3.622	3.552	3.288	2.983	2.767	1.562
1978	3.623	3.552	3.288	2.983	2.767	1.565
1979	3.623	3.552	3.288	2.983	2.767	1.565
1980	3.620	3.550	3.286	2.981	2.765	1.561
1981	3.622	3.552	3.288	2.983	2.767	1.565
1982	3.623	3.552	3.288	2.983	2.767	1.565
1983	3.623	3.552	3.288	2.983	2.767	1.565
1/10	4.957	4.875	4.536	4.176	3.897	2.675

MEAN OF ANNUAL VALUES = 1.847

STANDARD DEVIATION OF ANNUAL VALUES = .460

UPPER 90% CONFIDENCE LIMIT ON MEAN = 1.961

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Azoxystrobin - Almond - MLRA 17

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	3.256	3.190	2.943	2.636	2.444	1.216
1949	3.579	3.509	3.247	2.942	2.727	1.521
1950	3.617	3.547	3.283	2.978	2.762	1.556
1951	3.622	3.551	3.287	2.983	2.766	1.561
1952	3.643	3.572	3.307	3.003	2.786	1.600
1953	3.821	3.748	3.474	3.171	2.951	1.755
1954	3.734	3.662	3.393	3.089	2.870	1.661
1955	3.649	3.577	3.312	3.008	2.791	1.585
1956	3.623	3.553	3.289	2.984	2.768	1.710
1957	3.810	3.737	3.464	3.161	2.940	1.749
1958	3.816	3.743	3.468	3.166	2.946	1.707
1959	3.645	3.574	3.309	3.004	2.788	1.584
1960	3.963	3.888	3.608	3.306	3.082	2.133
1961	4.186	4.109	3.824	3.518	3.289	2.099
1962	4.136	4.059	3.774	3.469	3.242	1.952
1963	4.072	3.996	3.710	3.409	3.183	1.903
1964	3.673	3.602	3.335	3.031	2.813	1.608
1965	3.630	3.559	3.295	2.990	2.774	1.589
1966	4.356	4.277	3.993	3.678	3.447	2.295
1967	3.790	3.717	3.445	3.142	2.922	1.715
1968	3.641	3.570	3.305	3.001	2.784	1.579
1969	3.629	3.559	3.294	2.989	2.773	1.566
1970	3.646	3.575	3.310	3.005	2.788	1.588
1971	3.981	3.905	3.672	3.300	3.075	1.753
1972	3.676	3.605	3.412	3.186	2.989	1.720
1973	3.699	3.628	3.360	3.056	2.838	1.629
1974	3.683	3.612	3.345	3.041	2.823	1.708
1975	3.800	3.727	3.455	3.151	2.931	1.729
1976	3.641	3.571	3.306	3.001	2.785	1.579
1977	3.652	3.581	3.315	3.011	2.794	1.641
1978	4.232	4.154	3.870	3.561	3.332	2.115
1979	3.712	3.641	3.372	3.068	2.850	1.644
1980	3.879	3.806	3.529	3.226	3.005	1.792
1981	3.659	3.588	3.322	3.018	2.801	1.592
1982	3.628	3.558	3.293	2.989	2.772	1.565
1983	3.698	3.626	3.358	3.054	2.837	1.659
1/10	4.151	4.074	3.789	3.484	3.256	2.103

MEAN OF ANNUAL VALUES = 1.704

STANDARD DEVIATION OF ANNUAL VALUES = .204

UPPER 90% CONFIDENCE LIMIT ON MEAN = 1.755

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Azoxystrobin - Cucurbits - MRLA 156B - 6 @ 0.25 lb ai/ac

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1948	8.199	8.045	7.539	6.914	6.540	3.989
1949	14.150	13.980	13.040	12.510	11.810	6.719
1950	15.130	14.850	13.810	12.500	12.010	7.299
1951	15.100	14.830	14.080	13.400	12.460	7.453
1952	9.284	9.122	8.591	7.704	7.486	5.344
1953	13.450	13.190	12.640	11.510	10.710	6.256
1954	21.690	21.380	20.580	19.550	18.400	10.610
1955	18.490	18.150	17.230	15.400	14.060	8.604
1956	7.616	7.486	7.076	6.675	6.554	5.310
1957	12.170	11.920	11.410	10.410	10.010	5.927
1958	35.870	35.090	33.410	30.000	27.390	13.350
1959	18.300	17.940	16.640	14.720	13.500	8.778
1960	16.170	15.880	14.780	13.280	12.910	8.211
1961	9.067	8.908	8.423	7.755	7.200	5.065
1962	11.210	11.010	10.540	9.486	9.099	5.714
1963	20.950	20.600	19.260	16.610	15.060	7.917
1964	25.110	24.780	23.620	22.420	21.180	11.560
1965	21.390	20.970	19.350	18.080	16.850	9.793
1966	18.940	18.720	18.020	16.950	15.620	9.340
1967	18.530	18.260	17.410	15.480	14.320	8.387
1968	24.870	24.380	23.240	20.870	19.000	10.560
1969	17.130	16.830	15.850	15.090	14.650	8.962
1970	24.800	24.330	22.850	20.680	[illegible]	[illegible]
1971	24.990	24.480	22.720	21.520	20.390	11.550
1972	30.810	30.180	29.190	26.970	24.920	13.920
1973	15.810	15.580	15.070	14.020	13.330	8.674
1974	8.832	8.675	8.217	7.707	7.180	5.171
1975	12.600	12.390	11.930	11.390	10.560	6.001
1976	17.530	17.170	15.910	13.800	12.620	7.018
1977	35.750	35.360	33.490	29.910	27.820	14.470
1978	18.890	18.560	17.470	15.840	14.870	9.450
1979	34.620	33.820	32.040	29.840	28.120	14.770
1980	23.190	22.710	21.490	19.500	18.060	10.730
1981	15.430	15.210	14.730	13.690	12.790	7.954
1982	21.810	21.520	20.510	20.070	19.250	10.790
1983	11.940	11.750	11.310	10.130	9.289	6.078
1/10	31.353	31.272	30.045	27.831	25.661	13.521

MEAN OF ANNUAL VALUES = 8.665

STANDARD DEVIATION OF ANNUAL VALUES = 2.801

UPPER 90% CONFIDENCE LIMIT ON MEAN = 9.356

Appendix VI - Summary of Submitted Environmental Fate Studies - Subdivision N

Degradation Studies

161-1 Hydrolysis (MRID# 43678172)

This study provides acceptable data and completely satisfies the hydrolysis data requirement No additional data is required

Radiolabeled azoxystrobin, at a nominal concentration of 2.8 µg/mL, was stable over a 30-day study period in pH 5, 7, and 9 buffer solutions at 25°C and pH 5 and 7 buffer solutions at 50°C Radiolabeled azoxystrobin degraded slowly ($t_{1/2}$=209 hours; 8.7 days) in pH 9 buffer solution at 50°C Transformation products of were identified as (E0-2-(2-[6-(2-cyanophenyoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylic acid (Compound 2) and Compound 20, each at concentration below 10% of applied.

The reported results indicate azoxystrobin should be stable in to abiotic hydrolysis in aquatic environments and under normal environmental conditions of pH and temperature.

161-2 Photodegradation in Water (MRID# 43678173)

This study provides acceptable data on the photodegradation of azoxystrobin in pH 7 buffer solution and completely satisfies the data requirement.

Radiolabeled azoxystrobin in pH 7 buffer solution had photodegradation half-lives of 11.1 to 17.1 Florida equivalent summer days (k=-0.0418 to -0.0624 $days^{-1}$) under a Xenon lamp. Six phototransformation products were observed. Their formation and decline patterns are shown below:

Compound 9 was detected in all radiolabeled azoxystrobin treatments. Compound 9 had a maximum concentration of 15% of applied at 5 to 10 days after irradiation and then declined to less than 7 % of applied at 30 days posttreatment.

Compound 13 was detected in only the cyanophenyl labeled treatment Compound 13 had a maximum concentration of 1.7% at 30 days posttreatment.

Compound 21 was detected in all radiolabeled treatments. Compound 21 had a maximum concentration of 5 6% at 30 days posttreatment.

Compound 24 was detected in all radiolabeled treatments. Compound 24 had a maximum concentration of 2.6% at 30 days posttreatment.

Compound 28 was detected in the radiolabeled pyrimidinyl and cyanophenyl treatments. Compound 28 had a maximum concentration of 8.9% at 30 days posttreatment.

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Compound 30 was detected in all radiolabeled treatments. Compound 30 had a maximum concentration of 2.1% at 30 days posttreatment

Unidentified radiolabeled residues were separated by the 2-D TLC with a choroform methanol water formic acid and dichloromethane acetonitrile formic acid solvent systems. The maximum average corrected concentration would be 7.6% of the applied radioactivity per compound

Unidentified radiolabeled residues, designated as Remainders or diffuse radioactivity between distinct bands, were also detected. The cumulative concentration of Remainders ranges from 23 to 25% of applied radioactivity.

Radiolabeled CO_2 was identified (5.9% of applied) as the major volatile transformation product from photodegradation in water.

The reported results indicate azoxystrobin should photodegrade in aquatic environments.

161-3 Photodegradation on Soil (MRID# 43678174)

This study provides acceptable data and completely satisfies the photodegradation on soil data requirement. No additional data is required.

Radiolabeled azoxystrobin, at 1.0 lbs ai/A, had an average 50% degradation time (DT_{50}) of 11 days. The first order photodegradation half-life ranged from 17.6 to 28.4 days. There was minimal degradation of azoxystrobin in the dark control treatments. Eight phototransformation products were identified Their formation and decline patterns are shown below:

Compound 3, formed by oxidative cleavage of the diphenyl ether linkage, was detected in only the phenylacrylate labeled experiment. The maximum concentration of compound 3 was 0.7% of applied at 16.4 days posttreatment and declined to less than 0.5% of applied at 30.2 days posttreatment.

Compound 9, Z-isomer of azoxystrobin, was detected in all the labeled experiments. The maximum concentration of compound 9 ranged from 2.8 to 9.0% of applied during the 31 day irradiation experiment. No observable pattern of formation and degradation were observed.

Compound 13 was detected in only the cyanophenyl labeled experiment. The concentration of compound 13 was < 3.5% of applied during the 31 day irradiation experiment. No observable pattern of formation and degradation was observed.

Compound 19, formed by oxidation of compound 24, was detected in all labeled experiments. The concentration of compound 19 was < 6.0% of applied during the 31 day irradiation experiment.

Compound 24, formed by oxidative cleavage of the diphenyl ether, was detected (<3.2% of applied) in all labeled experiments.

Compound 28, formed by oxidative cleavage of the diphenyl ether link, was detected (<6.5% of applied) in the cyanophenyl labeled experiments

Compound 30, formed oxidation of compound 19, was detected (<5.0%) in all labeled experiments

Compound U13, formed by oxidative rearrangement of azoxystrobin, was detected (<5.2% of applied) in all radiolabeled experiments

Several unidentified transformation products (individually maximum 3.0% of applied) were also detected in the soil extracts

Radiolabeled CO_2 was identified (<27% of applied) as the major volatile transformation product from photodegradation in soil.

The reported results indicate azoxystrobin should photodegrade in terrestrial environments.

Metabolism Studies

162-1 Aerobic Soil Metabolism (MRIDs# 43678175 and 44046801)

Study (MRID# 43678175) in conjunction with additional data (MRID 44046801) provide acceptable data and fully satisfy the requirements for the metabolism of azoxystrobin in aerobic mineral soils. No additional data was required.

Radiolabeled azoxystrobin, at 0.57 µg/g, had a 50% dissipation time (DT_{50}) of 7.7 weeks (53.9 days) in the Hyde Farm soil, 12.2 weeks (85.4 days) in the 18 Acre soil, and 23.4 weeks (163.8 days) in the Visalia soil. The first-order degradation half-lives were 72 days in the Hyde Farm soil, 85 days in the 18 Acre soil, and 163.8 days in the Visalia soil. Four transformation products of azoxystrobin were identified in aerobic soils.

Compound 2 in the United Kingdom soil had a maximum concentration of 12 to 20% of applied at 62 days, declined to 9.5 to 15.2% of applied at 120 days posttreatment and then to 1.4 to 5.5% at 365 days. The maximum concentration of compound 2 in the Visalia soil was 28% of applied at 365 days posttreatment. No degradation of compound 2 was observed in the Visalia soil.

Compound 3 had a maximum concentration 1.5% of applied in the at 30 days posttreatment in the Hyde soil, 1.1% of applied at 62 days posttreatment in the 18 Acre soil, and 3.1% of applied at 120 days posttreatment in the Visalia soil. The concentration of compound 3 in all test soils declined to 0.3 to 1.5% of applied at 365 days posttreatment.

Compound 28 in the Visalia soil had a maximum concentration of 2.1% of applied at 120 days posttreatment.

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Compound 36 in all test soils had a maximum concentration of 0.4 to 2.8% of applied at 120 days posttreatment.

Unidentified bands/spots were also detected (cumulative 0.8 to 11.6% of applied) on the TLC plates. The registrant stated the unidentified radioactivity within a designated TLC band did not exceed 5% of the applied or extracted radioactivity.

Unidentified bands/spots were also detected (cumulative 0.8 to 11.6% of applied) on the TLC plates. Unextractable radiolabeled soil residues ranged from 16 to 22% at 120 days posttreatment. The cumulative concentration of $^{14}CO_2$ ranged from 2% to 27% of applied radioactivity.

The reported data indicate azoxystrobin should be moderately persistent to persistent in terrestrial environments.

162-2/162-3 Anaerobic Soil-Water Metabolism (MRID# 43678175)

This study provides <u>acceptable</u> data and completely satisfies the anaerobic soil-water systems data requirement. No additional data is required.

Radiolabeled azoxystrobin, at 0.57 µg/g, had DT_{50}s of 7 to 8 weeks in flooded Hyde Farm and 18 Acre soils. The DT_{50} was <2.1 days in the test water and 8.6 to 9.2 weeks in anaerobic Hyde Farm and 18 Acre soils.

Four transformation products of ICIA5504 were identified in anaerobic test soils.

Compound 2 was detected in the surface water and soil extracts. The maximum concentration of Compound 2 in the water-soil system was 60 to 68 % of applied at 181 days posttreatment and declined to 46 to 54% at 360 days posttreatment. The concentration of Compound 2 in the surface water ranged from 19 to 21% of applied at 181 days posttreatment, and declined to 11 to 17% at 360 days posttreatment. The concentration of Compound 2 in soil extracts ranged from 39 to 48% of applied at 120 days posttreatment and declined to 35% at 360 days.

Compound 3 had a maximum concentration of 0.1 to 0.6 % applied in the water-soil systems.

Compound 28 in the soil-water systems had a maximum concentration of 1.8 to 4.2% of applied at 62 days posttreatment and then declined to 1.5 to 2.6% of applied at 360 days posttreatment. This compound was predominately detected in soil extracts.

Compound 36 in the soil-water system shad a maximum concentration of 0.7 to 1.1% of applied at 360 days posttreatment.

Unidentified bands/spots were also detected (cumulative < 8.0 of applied) on the TLC plates.

Volatile residues in anaerobic soils were tentatively identified as CO_2. The cumulative concentration of $^{14}CO_2$ was < 5% of applied

Unextractable radiolabeled soil residues in aerobic soils ranged from 16 to 22% at 120 days posttreatment Unextractable radiolabeled soil residues in anaerobic soils ranged from 5 to 10% of applied at 120 days posttreatment

The reported data indicate azoxystrobin should be moderately persistent in flooded terrestrial environments.

162-4 Aerobic Aquatic Metabolism - No data was submitted. This study will be required for uses such as aquatic food crop, aquatic nonfood outdoor, aquatic nonfood industrial, aquatic nonfood residential and forestry

Soil Microbial Effects (MRID# 43678176)

This study provides ancillary data on the soil microbial effects of Azoxystrobin. The data are deemed as ancillary because the study is not a Subdivision N guideline study.

United Kingdom soils amended with azoxystrobin, at 0.25 and 2.50 kg ai/ha, had an increase of 6 to 12% in KCl extractable soil nitrate (NO_3^-) over non-treated controls. There were small or no differences in ammonium (NH_4^+) concentration between the azoxystrobin amended and control treatments. Nitrite (NO_2^-) was not detected in the azoxystrobin amended and control treatments.

Test soils amended with azoxystrobin did not significantly affect microbial respiration.

Mobility

163-1 Leaching - Adsorption/Desorption

Overall, the data submitted satisfy the requirement for the batch equilibrium study. No additional data is needed.

- This study (**MRID# 43678178**) provides acceptable data on partitioning of Azoxystrobin in mineral soils. These data in conjunction with batch equilibrium data **(MRID 43678181)** fulfill the unaged portion of the 163-1 data requirement

Radiolabeled azoxystrobin had Freundlich adsorption coefficients of 6.2 mL/g (1/n=0.85) in the Kenny Hill sandy loam soil, 4.0 mL/g (1/n=0.82) in the East Anglia loamy sand soil, 1.5 mL/g (1/n=0.90) in the Lilly Field sand soil, 9.5 mL/g (1/n=0.90) in the Nebo silty clay loam soil, and 15 mL/g (1/n=0.90) in the Pickett Piece clay loam soil.

- This study (**MRID# 43678181**) provides acceptable data on partitioning of azoxystrobin in mineral soils. These data in conjunction with batch equilibrium **data (MRID 43678178)** fulfill the unaged portion of the 163-1 data requirement.

Radiolabeled azoxystrobin had Freundlich adsorption coefficients of 2.9 mL/g (1/n=0.85) in the ERTC soil and 23 mL/g (1/n=0.90) in the NRTC soil.

- This study (**MRID# 43678179**) provides <u>acceptable</u> data the partitioning of Compound 2 in mineral soils These data in conjunction with the batch equilibrium data (**MRIDs 43678180** and **43678177**) fulfill the aged portion of the 163-1 data requirement.

Radiolabeled Compound 2 had Freundlich adsorption coefficients of 0.82 mL/g (1/n=0.90) in the Kenny Hill sandy loam soil, 0.35 mL/g (1/n=0.76) in the East Anglia soil, 1.4 mL/g (1/n=0.79) in the Lilly Field sand, 6.8 mL/g (1/n=0.90) in a Nebo silty clay soil, 0.85 mL/g (1/n=0.85) in the Hyde Farm sandy clay loam soil, and 10 mL/g (1/n=0.89) in the Pickett Piece clay loam soil.

- This study (**MRID# 43678180**) provides <u>acceptable</u> data on the partitioning of Compound 30 in mineral soils. These data in conjunction with the batch equilibrium data (**MRID# 43678179** and **43678177**) fulfill the aged portion of the 163-1 data requirement.

Radiolabeled Compound 30, at 0.03 to 2.0 µg/mL, had Freundlich adsorption partitioning coefficients of 0.74 mL/g (1/n=0.96) in a Kenny sandy loam soil, 2.0 mL/g (1/n=0.93) in a Wisborough Green silty clay loam soil, 0.27 mL/g (1/n=0.95) in a ERTC loamy sand soil, 4.2 mL/g (1/n=0.92) in a NRTC silty clay loam soil, 0.65 mL/g (1/n=0.96) in the Hyde Farm sandy clay loam soil, and 2.9 mL/g (1/n=0.96) in the Pickett Piece clay loam soil.

- This study (**MRID# 43678177**) provides <u>marginally acceptable</u> data on the partitioning of Compound 28 in mineral soils. The data are deemed [redacted] the registrant did not provide a complete description of the [redacted] acceptance of the data because Compound 28 is expected [redacted] terrestrial and aquatic environments. These data in conjunction with the batch equilibrium data (**MRID# 43678179** and **43678180**) fulfill the aged portion of the 163-1 data requirement.

Radiolabeled Compound 28 had Freundlich adsorption coefficients 2.4 mL/g (1/n=0.84) in the Kenny Hill sandy loam soil, 1.6 mL/g (1/n=0.85) in the Wisborough Green silty clay loam soil, 0.76 mL/g (1/n=0.81) in the ERTC loamy sand soil, 11 mL/g (1/n=0.89) in the NRTC silty clay loam soil, 1.90 mL/g (1/n=0.96) in the Hyde Farm sandy clay loam soil, and 2.9 mL/g (1/n=0.96) in the Pickett Piece clay loam soil

163-2 Laboratory Volatility - This study was <u>waived</u> because azoxystrobin has a low vapor pressure (8.2×10^{-13} mm Hg at 20 °C)

163-3 Field Volatility - This study was <u>waived</u> because azoxystrobin has a low vapor pressure (8.2×10^{-13} mm Hg at 20 °C)

Dissipation Studies

164-1 Terrestrial Field Dissipation

Overall, the requirements for terrestrial field dissipation studies are partially satisfied. Some additional data are needed to fully satisfy the Subdivision N Guideleines, and are listed with each study. The submitted data are, however, usable and could be incorporated into the fate assessment of azoxystrobin and its transformation products.

- This study (**MRID# 43678184**) provides upgradable supplemental data on the field dissipation of azoxystrobin and its transformation products on a California turf site. The data are deemed supplemental because storage stability data were inadequate to support a 24 month storage period and hydrology of the study site was not clearly described. The data may be upgraded with the submission of storage stability data to support a 24 month storage period and a complete description of the hydrology on the study site.

Azoxystrobin, applied as 5 applications of 1.0 lb a.i./A/application at 14-day intervals, had DT_{50}s of 8 to 24 days. The first-order dissipation half-life was 65 days. The difference between the surface soil DT_{50} and $t_{1/2}$ indicates some biphasis characteristics of the chemical dissipation in the California turf site. Azoxystrobin residue was detected in the surface soil immediately after the first treatment (0.34 mg/kg), reached a maximum of 1.7 mg/kg at post fifth application (last treatment), and declined to 0.02 mg/kg 377 days after last treatment. Major transformation products were Compound 28 (R401553), Compound 9 (R230310), and Compound 2 (R234886). Azoxystrobin and Compound 2 were detected in surface soil samples at 377 days after the last treatment. Compound 2 was also detected in deep soil [illegible] 62, 97, and 196 and 377 days after the last application, with concentration ranging from 0.15 to 0.02 mg/kg. Azoxystrobin, Compound 28, and Compound 9 were not detected in deep soil samples (> 6 inches). The pattern of formation and decline of the transformation products are shown below.

Compound 9- The surface soil reached a maximum concentration of 0.05 mg/kg at immediately after the last application, declined to 0.03 mg/kg at 30 days after the last treatment and was not-detectable (< 0.02 mg/kg) at 62 days after the last treatment.

Compound 2 - The surface soil reached a maximum concentration of 0.6 mg/kg at 30 days at the last application, then declined to 0.18 mg/kg at 196 days after the last treatment and 0.05 mg/kg at 377 days after the last treatment.

Compound 28 - The surface soil reached a maximum concentration of 0.03 mg/kg after the last treatment, declined to 0.01 mg/kg at 62 days after the last treatment and was not-detectable (< 0.01 mg/kg) at 97 days posttreatment.

- This study (**MRID# 43678185**) provides upgradable supplemental data on the field dissipation of azoxystrobin and its transformation products on a bare ground in California. The data are supplemental because storage stability data were inadequate to support a 22 month sample storage period and the hydrology of the study site was not clearly described. The data can be upgraded with submission of storage stability data to support a 22 month sample storage period and a complete description of the hydrology on the study site.

Azoxystrobin, applied as five applications of 0.4 lbs a.i./A at 14 day intervals, had DT_{50}s of 12 to 13 days The first-order dissipation half-life was 85 days. The difference between the surface soil DT_{50} and $t_{1/2}$ indicates some biphasis characteristics of the chemical dissipation on California bare ground Azoxystrobin residue was detected in the surface soil immediately after the first treatment (0.23 mg kg), reached a maximum of 0.27 mg/kg at post fifth application (last treatment), declined to 0.03 mg/kg 96 days after last treatment, and was not-detectable after that date. Transformation products were identified as Compound 30 (R402173) and Compound 28 (R401553). These compounds were detected at 96 to 182 days in the surface soil, after the last Azoxystrobin application. Azoxystrobin and its transformation products were not detected in deep soil samples (> 6 inches). The pattern of formation and decline for these transformation products is described below.

Compound 30 - The surface soil reached a maximum concentration of 0.08 mg/kg at immediately after the fourth application, declined to 0.01 mg/kg at 182 days after the last treatment and was non-detectable (< 0.01 mg/kg) at 371 days after the last treatment.

Compound 28 - The surface soil reached a maximum concentration of 0.05 mg/kg at after the last treatment (70 days after the first application or Day 0), declined to 0.01 mg/kg at 182 days after the last treatment and was non-detectable (< 0.01 mg/kg) at 371 days posttreatment.

- This study (**MRID# 43678186**) provides upgradable supplemental data on the field dissipation of azoxystrobin and its transformation products on turf in [illegible] supplemental because storage stability data were inadequate to support a 19 month sample storage period and the hydrology of the study site was not clearly described. The data can be upgraded with submission of storage stability data to support a 19 month sample storage period and a complete description on the hydrology of the study site.

Azoxystrobin, applied at five applications of 1.0 lbs a.i./A at 14 day intervals, had DT_{50}s of 8 to 23 days. The first-order dissipation half-life of was 60 days. The difference between the surface soil DT_{50} and $t_{1/2}$ indicates some biphasis characteristics of the chemical dissipation on turf in Florida. Azoxystrobin residue was detected in the surface soil immediately after the first treatment (0.32 mg/kg), reached a maximum of 1.1 mg/kg at post fifth application (last treatment), declined to 0.05 mg/kg 176 days after last treatment, and was not-detectable after that date. Transformation products were identified as Compound 9 (R230310) and Compound 2 (R234886). These compounds were detected 14 days to 176 days after the last application. Azoxystrobin, Compound 9, and Compound 2 were not detected in deep soil samples (> 6 inches). The pattern of formation and decline of these transformation products are shown below.

Compound 9 - The surface soil reached a maximum concentration of < 0.03 mg/kg at 14 days after the last treatment and then declined to below detection limits (< 0.02 mg/kg) at 28 days posttreatment.

Compound 2 - The surface soil reached a maximum concentration of 0.34 mg/kg at 14 days after the last treatment, declined to 0.05 mg/kg at 176 days after the last treatment and was non-detectable (< 0.02 mg/kg) at 360 days after the last treatment.

- This study (**MRID# 43678187**) provides upgradable supplemental data on the field dissipation of radiolabeled azoxystrobin and its transformation products on bare ground plots in California. The data are deemed supplemental because the hydrology of the study site was not clearly described. The data may be upgraded with a complete description of the hydrology on the study site.

Radiolabeled Azoxystrobin, at 0.5 lbs a.i/A, had a DT_{50} of 14 days. The first-order dissipation half-life ranged from 28 to 34 days. Radiolabeled azoxystrobin residues in surface soil decreased from an average of 95% immediately posttreatment to <10% at 120 days posttreatment. Transformation products were identified as Compound 2, Compound 28 and Compound 30. The pattern of formation and decline of these transformation products are shown below.

Compound 28 - The surface soil reached a maximum concentration of 8% of applied at 2 months posttreatment and declined to < 3% at 4 months posttreatment.

Compound 30 - The surface soil reached a maximum concentration of 5.3% at 1 to 2 months posttreatment and declined to < 2% at 4 months posttreatment.

Compound 2 - This compound was detected in surface soil at low concentrations (<1%) at 2 and 4 months posttreatment.

Unidentified radiolabeled residues were detected (maximum 5% of applied) in the 5 to 15 cm soil layer from immediately posttreatment to 120 days posttreatment. No radiolabeled residues were detected in the 15 to 107 cm soil layers.

- This study (**MRID# 44058710**) is scientifically valid and provides useful information on the terrestrial field dissipation of azoxystrobin on bare soil in California. This study (**MRID# 44058709**) provides supplemental information on CO_2 evolution during the terrestrial field dissipation of azoxystrobin on bare soil in California. This study does not meet Subdivision N Guidelines for the fulfillment of EPA data requirements on terrestrial field dissipation for the following reasons:

(i) the study was not conducted under typical use conditions; the application procedure was atypical of actual use;
(ii) an inadequate number of soil cores was collected;
(iii) a storage stability study was not conducted; and
(iv) method detection limits were not reported for TLC (**MRID# 44058710**) and LSC (**MRID# 44058709**).

Radiolabeled [^{14}C]azoxystrobin, at a nominal application of 0.5 lb ai/A, dissipated with a registrant-calculated DT_{50} (combined for three radiolabels) of approximately 14 days in bare sandy loam soil in California.

Uniformly cyanophenyl ring-labeled [^{14}C]azoxystrobin was initially detected in the 0- to 5-cm depth at 91.4% of the applied radioactivity, decreased to 54.9% of the applied by 7 days and 7.8% by 2 months posttreatment, and was 2.5% at 12 months posttreatment. Transformation products were identified as Compound 28, Compound 30, and Compound 2. These compounds were detected 14 days to 2 months posttreatment, with a maximum concentration of 6.7% (Compound 28) of the applied. Unidentified radioactivity was seen at a maximum of 10.1% at 14 days posttreatment. Radioactivity was detected at maximum level in the 5- to 15-cm depth, and declined to non-detected in soils deeper than 30 cm.

Pyrimidine labeled [5-^{14}C]azoxystrobin was initially detected in the 0- to 5-cm depth at 96.5% of the applied radioactivity, decreased to 59.5% of the applied by 14 days and 13.8% by 2 months posttreatment, and was 1.4% at 12 months posttreatment. Transformation products were identified as compound 28, Compound 30, and Compound 2. These compounds were detected 28 days to 4 months posttreatment, with a maximum concentration of 6.3% (Compound 30) of the applied. Unidentified radioactivity was seen at a maximum of 7.0% at 1 day and 2 months posttreatment. Radioactivity was detected at maximum level in the 5- to 15-cm depth, and declined to non-detected in soils deeper than 30 cm.

Uniformly phenylacrylate ring-labeled [^{14}C]azoxystrobin was initially detected in the 0- to 5-cm depth at 97.6% of the applied radioactivity, decreased to 40.1% of the applied by 14 days posttreatment and was 2.0% at 12 months posttreatment. Transformation products were identified as Compound 30 and Compound 2. These compounds were detected 28 days to 12 months posttreatment, with a maximum concentration of 4.1% of the applied radioactivity. Unidentified radioactivity was at a maximum of 7.3% at 1 month posttreatment. Radioactivity was detected at maximum level in the 5- to 15-cm depth, and declined to non-detected in soil deeper than 46 cm.

Radiolabeled $^{14}CO_2$ accounted for 2.89% (phenylacrylate label), 1.95% (pyrimidine label) and 2.42% (cyanophenyl label) of the applied radioactivity at 14 days posttreatment.

• This study (**MRID# 44058712**) is <u>scientifically valid</u> and provides supplemental information on the terrestrial field dissipation of azoxystrobin on a turf plot in Florida. The dissipation and mobility of two degradates (Compound 28 and Compound 30) were studied; no samples were not analyzed for the parent compound and additional degradates. The nominal application rate of the parent compound exceeded (2x) the proposed maximum usage rate. While exaggerated rates may be used to facilitate residue identification, EPA requires that kinetics studies be conducted with the proposed maximum usage rate. This study <u>does not meet Subdivision N Guidelines</u> for the fulfillment of EPA data requirements on terrestrial field dissipation for the following reasons:

(i) samples were not analyzed for the parent compound and half-lives were not determined;
(ii) the major degradates in the metabolism studies were not monitored;
(iii) a storage stability study was not submitted.

Following five broadcast spraying applications (at two-week intervals) of azoxystrobin at a nominal rate of 5.0 lb ai/A (1.0 lb ai/A/application) onto a sand soil plot planted with turf near Oviedo, Florida. Compound 28 was detected in the 0- to 6-inch depth at a maximum concentration of 0.02 mg/kg following the third application, before and after the fourth and fifth applications and at 14 days posttreatment; and was 0.01 mg/kg at 28 and 59 days posttreatment. This degradate dissipated rapidly such that it was undetected in samples taken 87 days after the last application. No measurable residues (greater than the limit of detection of 0.01 mg/kg) of Compound 30 were found in any samples.

- This study (**MRID# 44058713**) is of <u>questionable scientific validity</u> and does not provide useful information on the terrestrial field dissipation of azoxystrobin (wettable granule formulation only) in bare soil in California. The half-life value of 8-10 days for azoxystrobin is questionable based on the relatively high concentration of the parent remaining at intervals beyond the calculated half-life.

This study is <u>scientifically valid</u> and provides useful information on the terrestrial field dissipation of azoxystrobin (soluble concentrate formulation) in bare soil in California. This study <u>does not meet Subdivision N Guidelines</u> for the partial fulfillment of EPA data requirements on terrestrial field dissipation for the following reasons:

(i) a storage stability study was not provided;
(ii) samples were not collected randomly; and
(iii) inadequate details were provided for the analytical method.

Azoxystrobin 50 WG, broadcast sprayed at a nominal [illegible] registrant-calculated half-life of 8-10 days in a bare ground plot of sandy loam soil near Visalia, California. The half-life of the parent compound is however questionable. Azoxystrobin was detected in the 0- to 6-inch depth at 0.12 to 0.14 mg/kg from 0 to 3 days posttreatment, decreased to 0.11 mg/kg by 14 days posttreatment, was not detected at 28 days posttreatment and was 0.02-0.03 mg/kg at 63 days posttreatment. The parent compound was detected in the 6- to 12-inch depth at 0.20 mg/kg at 7 days posttreatment and was not detected below the 0- to 6-inch depth at any other sampling interval. The major degradate Compound 28 was detected in the 0- to 6-inch depth at 0.02-0.03 mg/kg from 14 to 63 days posttreatment and was not detected at any other sampling interval or at lower depths.

Azoxystrobin 25 SC, broadcast sprayed at a nominal rate of 0.5 lb ai/A, dissipated with a registrant-calculated half-life of 7-21 days in a bare ground plot of sandy loam soil near Visalia, California. Azoxystrobin was detected in the 0- to 6-inch depth at 0.20 mg/kg immediately after application, decreased to 0.14 mg/kg by 7 days posttreatment, and was 0.06 mg/kg from 28 to 63 days posttreatment. The parent compound was not detected below the 0- to 6-inch depth. Compound 28, was detected in the 0- to 6-inch depth at 0.01-0.03 mg/kg from 3 to 63 days posttreatment. Compound 30 was detected in the 0- to 6-inch depth at a maximum of 0.02 mg/kg at 7 days posttreatment. No degradates were detected below the 0- to 6-inch depth.

- This study (**MRID# 44058711**) is <u>not scientifically valid</u> and does not provide useful information on the terrestrial field dissipation of azoxystrobin on bare soil in Mississippi. The half-life was of questionable validity because the sampling intervals were inadequate to accurately establish the half-life of the parent compound; greater than 50% of the parent compound degraded between the first and second sampling intervals following the final pesticide application. At the second sampling interval (12 days posttreatment), the parent compound was detected at only 22-26% of the concentration detected immediately following the final application. This study <u>does not meet Subdivision N Guidelines</u> for the partial fulfillment of EPA data requirements on terrestrial field dissipation for the following reasons

  (i) inadequate sampling intervals were utilized;
  (ii) a storage stability study was not provided;
  (iii) samples were not collected randomly; and
  (iv) inadequate details were provided for the analytical method.

This study was submitted in partial fulfillment of the terrestrial field dissipation data requirements. Additional studies on bare ground plots in California (MRID 44058710 and 4458713) and turf plots in Florida (MRID 44058712) are described above.

Azoxystrobin, broadcast sprayed in five applications (at 13-16 day intervals) at a total nominal rate of 2.0 lb ai/A, dissipated with a registrant-calculated half-life of 2-4 days in a bare ground plot of loam soil near Leland, Mississippi. Half-life values were of questionable validity, because the parent compound was detected at the second sampling interval following the fifth application at only 22-26% of the concentration detected immediately posttreatment. Parent azoxystrobin was detected in the 0- to 6-inch depth at concentrations [illegible] following the first four applications and at 0.20 mg/kg immediately following the fifth application. At 12 days posttreatment (second sampling interval), azoxystrobin was observed at 0.05 mg/kg and ranged from 0.01 mg/kg to 0.03 mg/kg from 26 to 85 days posttreatment. Neither the parent compound nor the degradates were detected below the 0- to 6-inch depth throughout the study. However, Compound 30 was detected in the 0- to 6-inch depth at a maximum concentration of 0.02 mg/kg immediately following the second application and immediately before the fourth application, but was not detected following the fourth application.

164-2 Aquatic Field Dissipation in Rice Paddies (MRID# 44319302)

The California study is <u>not scientifically valid</u> and does not provide useful information on the aquatic field dissipation of azoxystrobin on <u>rice plots in California</u>. The floodwater flowing out of the California site was not analyzed, precluding the determination of whether the pesticide dissipated in the plot or was moved out of the study area. The Mississippi study is <u>scientifically valid</u> and provides useful information on the aquatic field dissipation of azoxystrobin in <u>rice plots in Mississippi</u>.

This study does not meet Subdivision N Guidelines for the fulfillment of EPA data requirements on aquatic field dissipation for the following reasons:

(i) the floodwater (outflow only) at the California site was not analyzed; and
(ii) adequate storage stability data were not provided for either site.

Azoxystrobin was broadcast sprayed three times at a nominal application rate of 0.3 lb a.i./A application to flooded soils. In the *Mississippi's Bosket sandy loam to silt loam soil plots* planted with rice, the average half-life was 4 days for floodwater (static system) and 225 days for soil samples. Note that the floodwater half-life calculations were based on data from water samples collected separately rather than from water collected with soil cores, and the concentration reported below are average values from a sampling occasion. In flooded water, the parent compound was at a maximum concentration of 0.208 mg/l 2 days immediately following the first application, decreased to 0.117 mg/l after the second application and increased to 0.194 mg/l after the third application. On the day of the final draining of the paddies (9 days after the third application), the concentration decreased to 0.026 mg/l. Compound 2 was detected in the water samples at ≤0.025 mg/l, as the only transformation product of azoxystrobin. In soil cores, the parent compound reached a maximum of 0.10 mg/kg immediately after the second treatment, then slowly dissipated to 0.06 mg/kg 184 days after the third treatment, and to 0.03 mg/kg after 373 days. Compound 2 (≤0.03mg/kg) was the only detected degradation product in soil samples.

In the *California's Stockton clay soil plots* planted with rice, the average half-life was 4 days in floodwater (flow-through system) and 370 days in soil. Note that the floodwater half-life calculations were based on data from water samples collected separately rather than from water collected with soil cores, and the concentration reported are average values from a sampling occasion. In flooded water, the parent compound was detected at a maximum concentration of 0.058 mg/l 8-14 hours immediately following the first application, decreased to 0.025 mg/l after the second application and to 0.017 mg/l after the third application. By the [illegible] after the third treatment, azoxystrobin was undetected (< 0.010 mg/l). In soil cores, the parent compound reached a maximum of 0.10 mg/kg immediately after the second treatment, then slowly dissipated to 0.05 mg/kg 192 days after the third treatment, and to 0.03 mg/kg after 373 days. No degradation product was detected in any of the floodwater or soil samples.

Foliar Dissipation Studies - Ancillary data on foliar dissipation of Azoxystrobin was also submitted **(MRID's # 44150911 and 44058708)** to assess the contribution of foliar dissipation to the overall field dissipation processes. However those data were not usable in the modeling as they did not distinguish between foliar applied residues through wash-off onto soil surface, photodegradation on the leaf surface, or binding into the leaf cuticle. These data only assist in elucidating the major route of dissipation of azoxystrobin.

Azoxystrobin had a foliar dissipation half-life of 7 to 29 days (average = 14 days) for fresh wheat foliage, 6 to 13 days (average = 10 days) for dry wheat foliage, 9 to 14 days (average = 11 days) for fresh barley foliage, and 7 to 11 days (average = 8 days) for dry barley foliage. Foliar wash-off did not appear to be a major route of dissipation of azoxystrobin, as there was little correlation between rainfall amount and residue decline.

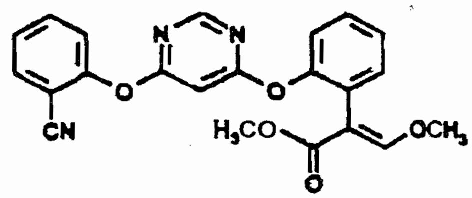
Accumulation Studies

165-4 Accumulation in Fish - This study is waived because azoxystrobin has a low octanol-water partitioning coefficient (K_{ow} = 316.22).

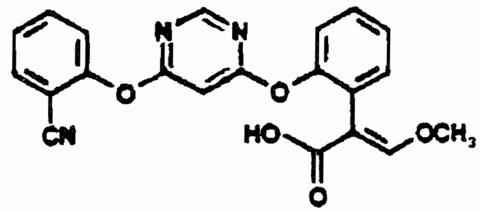
165-5 Accumulation in Non-Target Organisms - This study is waived because azoxystrobin has a low octanol-water partitioning coefficient (K_{ow} = 316.22).

Appendix VII - Chemical Structures

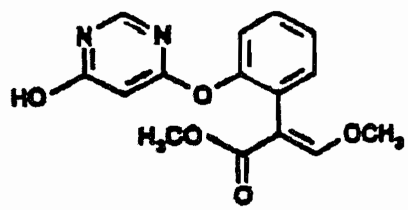
Compound 1 (ICIA5504)
Methyl (E)-2-{2-[6-(6-2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate



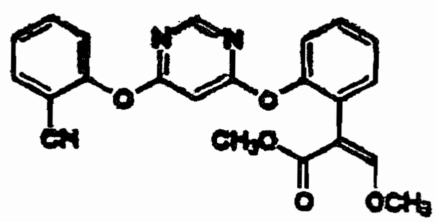
Compound 2 (R234886)
(E)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]-3-methoxyacrylic acid



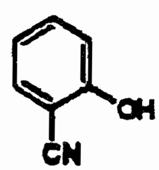
Compound 3 (R219277)
Methyl (E)-2-{2-(6-hydroxypyrimidin-4-yloxy)phenyl}-3-methoxyacrylate



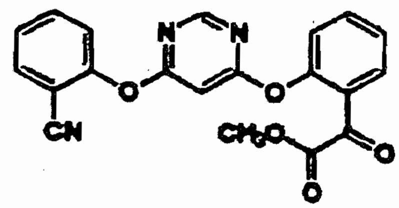
Compound 9 (R230310)
Methyl(Z)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]-3-methoxyacrylate



Compound 13 (R71395)
2-hydroxybenzonitrile



Compound 19 (R230309)
Methyl 2-{2-[2-6-(2-cyanophenoxy)pyrimidin-4yloxy]phenyl}oxoacetate



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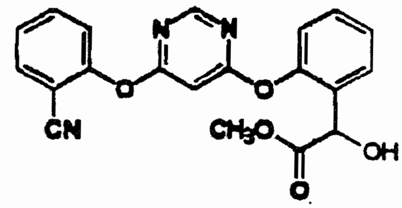
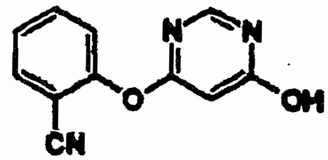
Appendix VII (continued) - Chemical Structures



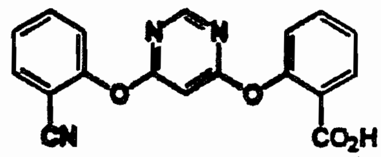
Compound 24 (R440753)

Methyl 2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}glycolate



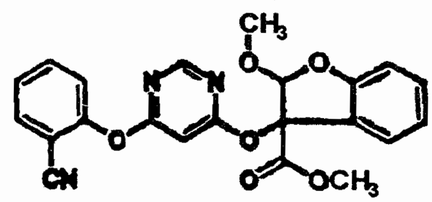
Compound 28 (R401553)

4-(2-cyanophenoxy)-6-hydroxypyrimidine

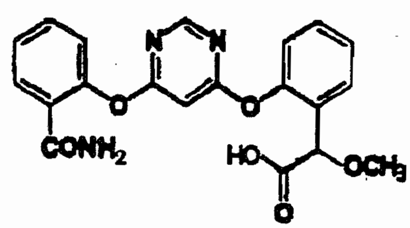


Compound 30 (R402173)

2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}acetate



Compound U13



Compound 36

(E)-2-{2-[6-(2-carbamoylphenoxy)pyrimidin-4-yloxy]phenyl}-methyoxyacrylic acid

Chemical No. 128810

ECOTOXICITY DATA REQUIREMENTS FOR AZOXYSTROBIN

Data Requirement	Use Pattern	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA 3(c)(2)(B)?
§158.490 WILDLIFE AND AQUATIC ORGANISMS				
71-1(a) Acute Avian Oral, Quail/Duck	All	Yes	436781-08	No
71-2(a) Acute Avian Diet, Quail	All	Yes	436781-10	No
71-2(b) Acute Avian Diet, Duck	All	Yes	436781-11	No
71-3 Wild Mammal Toxicity				
71-4(a) Avian Reproduction Quail	All	Yes	444523-01	No
71-4(b) Avian Reproduction Duck	All	Yes	436781-13	No
71-5(a) Simulated Terrestrial Field Study				
71-5(b) Actual Terrestrial Field Study				
72-1(a) Acute Fish Toxicity Bluegill	All	Yes	436781-14	No
72-1(b) Acute Fish Toxicity (TEP)				
72-1(c) Acute Fish Toxicity Rainbow Trout	All	Yes	436781-15	No
72-1(d) Acute Fish Toxicity Rainbow Trout (TEP)				
72-2(a) Acute Aquatic Invertebrate	All	Yes	436781-16	No
72-2(b) Acute Aquatic Invertebrate (TEP)				
72-3(a) Acute Est/Mar Toxicity Fish	All	Yes	436781-17	No
72-3(b) Acute Est/Mar Toxicity Mollusk	All	Yes	436781-19	No
72-3(c) Acute Est/Mar Toxicity Shrimp	All	Yes	436781-18	No
72-3(d) Acute Est/Mar Toxicity Fish (TEP)				
72-3(e) Acute Est/Mar Toxicity Mollusk (TEP)				
72-3(f) Acute Est/Mar Toxicity Shrimp (TEP)				
72-4(a) Early Life Stage Fish	All	Yes	436781-20	No
72-4(b) Life Cycle Aquatic Invertebrate	All	Yes	436781-21	No
72-5 Life Cycle Fish				
72-6 Aquatic Organism Accumulation				
72-7(a) Simulated Aquatic Field Study				
72-7(b) Actual Aquatic Field Study				
§158.540 PLANT PROTECTION				
122-1(a) Seedling Enmergence	All	Yes	436781-56	No
122-1(b) Vegetative Vigor	All	Yes	436781-58	No
122-2 Aquatic Plant Growth				

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Data Requirement	Use Pattern	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA 3(c)(2)(B)?
123-1(a) Seedling Emerg	All	Yes	436781-60	No
123-1(b) Vegetative Vigor				
123-2 Aquatic Plant Growth	All	Yes	436781-61, -62, -63, -64, -65	No
124-1 Terrestrial Field Study				
124-2 Aquatic Field Study				
§158.490 NONTARGET INSECT TESTING				
141-1 Honey Bee Acute Contact	1	Yes	436781-66, -67 (TEP)	No
141-2 Honey Bee Residue on Foliage				
141-5 Fueld Test for Pollinators				

FOOTNOTES:

[1] 1=Terrestrial Food; 2=Terrestrial Feed; 3=Terrestrial Non-Food; 4=Aquatic Food; 5=Aquatic Non-Food(Outdoor);6=Aquatic Non-Food (Industrial);7=Aquatic Non-Food (Residential);8=Greenhouse Food; 9=Greenhouse Non-Food;10= Forestry; 11=Residential Outdoor; 12=Indoor Food; 13=Indoor Non-Food; 14=Indoor Medicinal;15=Indoor Residential.

APPENDIX I:

ENVIRONMENTAL FATE DATA REQUIREMENTS FOR AZOXYSTROBIN

Data Requirement	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA 3(c)(2)(B)?
§158.290 ENVIRONMENTAL FATE			
Degradation Studies-Lab:			
161-1 Hydrolysis	Yes	436781-72	No
161-2 Photodegradation In Water	Yes	436781-73	No
161-3 Photodegradation On Soil	Yes	436781-74	No
161-4 Photodegradation in Air	NR		
Metabolism Studies-Lab:			
162-1 Aerobic Soil	Yes	436781-75	No
162-2 Anaerobic Soil	Yes	436781-75	No
162-3 Anaerobic Aquatic	NR		
162-4 Aerobic Aquatic	NR		
Mobility Studies:			
163-1 Leaching- Adsorption Desorp.	Yes	436781-78 436781-81 436781-77 436781-79 436781-80	No
Dissipation Studies-Field:			
164-1 Soil	Yes	436781-84 (Upgrad. Suppl) 436781-85 (Upgrad. Suppl) 436781-86 (Upgrad. Suppl) 436781-87 (Upgrad. Suppl) 440587-10 (Suppl) 440587-12 (Suppl) 440587-13 (Suppl)	No
164-2 Aquatic	Yes (Mississippi)	443193-02	No
Accumulation Studies:			
165-4 In Fish	NR		Waived
Ground Water Monitoring Studies:			
166-1 Small-Scale Prospective	NR		Reserved
'158.440 Spray Drift:			
201-1 Droplet Size Spectrum			Reserved[1]
202-1 Drift Field Evaluation			Reserved[1]

FOOTNOTES:

[1] No azoxystrobin-specific spray drift studies were reviewed. The registrant, Zeneca, is a member of the Spray Drift Task Force (SDTF). The SDTF has completed and submitted to the Agency a series of studies intended to characterize spray droplet drift potential due to various factors, including application methods, application equipment, meteorological conditions, crop geometry and droplet characteristics. EFED is currently evaluating these studies. After its review, the Agency will determine whether a reassessment is warranted of the potential risks from the application of azoxystrobin to nontarget organisms.