United States Environmental Protection Agency

Office of Prevention, Pesticides and Toxic Substances (7501C)

Pesticide Fact Sheet

Name of Chemical: Azoxystrobin
Reason for Issuance: Conditional Registration
Date Issued: February 7, 1997

DESCRIPTION OF CHEMICAL

Chemical Name: Methyl(E)-2-{2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate

Common Name: Azoxystrobin

Trade Name: Heritage™ Fungicide, ICIA5504 Fungicide

Active Ingredient Codes:
EPA Pesticide Chemical Code: 128810
CAS Registry Number:

Year of Initial Registration: 1997

Function of Active Ingredient: Fungicide

U.S. Producer: Zeneca Ag Products
1800 Concord Pike
P.O. Box 15458
Wilmington, Delaware 19850-5458
302-886-1553

Classification of End-Use Products: Unclassified

DESCRIPTION OF USE PATTERNS

The Agency has issued one conditional registration for an

end-use product containing the active ingredient, Azoxystrobin, to Zeneca Ag Products. The use pattern of this product is as follows:

Heritage Fungicide, EPA Reg. No. 10182-408 (50.0.% Azoxystrobin). This product is formulated as wettable granules. Azoxystrobin has been processed as a Reduced Risk pesticide for Turf uses.

Sites: Golf courses and commercial turf farms.

Pests: Anthracnose (Colletotrichum graminicola), Brown Patch (Rhizoctonia solani), Cool Weather Brown Patch (Rhizoctonia cerealis), Fusarium Patch (Microdochium nivale), Gray Snow Mold (Typhula spp.), Leafspot (Drechslera spp. and/or Bipolaris spp.), Melting Out (Drechslera spp. and/or Bipolaris spp.), Necrotic Ring Spot (Leptosphaeria korrae), Pink Snow Mold (Microdochium nivale), Pythium Blight (Pythium spp.), Pythium Root Rot (Pythium spp.), Red Thread (Laetisaria fuciformis), Rhizoctonia Large Patch (Rhizoctonia solani), Spring Dead Spot (Leptosphaeria korrae or Gaeumannomyces graminis), Summer Patch (Magnaporthe poae), Take-all Patch (Gaeumannomyces graminis), Yellow Patch (Rhizoctonia cerealis), and Zoysia Patch (Rhizoctonia solani and/or Gaeumannomyces incrustana).

Type of Application: Ground spray.

SUMMARY OF SCIENCE FINDINGS

Azoxystrobin is the first of a new class of pesticidal compounds called ß-methoxyacrylates, which are derived from the naturally-occurring strobilurins. Their biochemical mode of action is inhibition of electron transport. The initial product that is being registered is an end-use product (EUP) that is formulated as water-soluble granules.

Azoxystrobin is of low acute and chronic toxicity to humans, birds, mammals, and bees but is highly toxic to freshwater fish, freshwater invertebrates, and estuarine/marine fish, and very highly toxic to estuarine/marine invertebrates. The Azoxystrobin degradate R234886 is practically nontoxic to Rainbow Trout and daphnids, while the degradates R402173 and R401553 may be

slightly toxic to daphnids. Azoxystrobin is not a carcinogen.

Some in-house environmental effects models indicate that levels of concern (LOCs) for Turf uses of Azoxystrobin are exceeded for small herbivores and several groups of fish and aquatic invertebrates. However, these models all significantly overestimate risk for these groups of organisms when applied to Turf uses. Azoxystrobin is unlikely to appear in the estuarine environment at concentrations that exceed Levels of Concern and its degradates do not appear to have unreasonable toxicity for freshwater animals. Therefore, the Agency believes that registration Of Azoxystrobin for use on Turf does not pose an unreasonable risk to any taxon of terrestrial or aquatic animals.

Laboratory studies show that Azoxystrobin is moderately persistent in soil in the absence of light and potentially moderately mobile in coarse textured soils (e.g., sand and loamy sand soils). Upgradable, supplemental field dissipation studies indicate that Azoxystrobin was moderately immobile and relatively non-persistent under actual use conditions. The potential mobility and persistence of some degradates, based on batch equilibrium studies, aerobic soil metabolism, and some field dissipation studies, are similar to pesticides with a potential to leach into ground water under some conditions. A groundwater advisory has, therefore, been placed on the label.

The registrant claims that Azoxystrobin is effective in controlling Brown Patch, Pythium Blight, and Melting Out (Leaf Spot) but does not control Dollar Spot. It has a single-site mode of action so the labeling contains directions for use that are intended to forestall the development of resistance to Azoxystrobin among pests and that promotes the use of IPM.

A. Chemical Characteristics

The physico-chemical characteristics of the EUP that is being registered are as follow.

Physical/Chemical Properties of Azoxystrobin Active Ingredient

Color:	White
Molecular Formula:	$C_{22}H_{17}N_3O_5$
Molecular Weight:	403.4
Physical State	Powdery solid
Melting Point	116°C
Vapor Pressure:	1.1×10^{-13} kPa @ 25°C

Solubility (water): 6.0 mg/l

Physical/Chemical Properties of Heritage Fungicide

Color:	Beige
Physical State:	Solid
Odor:	None
Bulk Density:	0.58 g/cc
pH:	7.14 (1% dispersion)
Stability:	Chemically stable for at least 14 days at 54°C

The data provided fulfill all Product Chemistry data requirements for registration of Azoxystrobin use on Turf, except for Storage Stability (GRN 63-17; a one-year interim report has been submitted, however) and do not indicate any unusual area of concern.

B. Toxicological Characteristics:

For Heritage Fungicide the Agency required six acute toxicology studies. For the Technical product the Agency required a complete battery of toxicological and adsorption/ distribution/metabolism/excretion (ADME) tests. The results are as follow.

Test Name	Results	Tox. Category
I. Heritage Fungicide, EPA Reg. No. 10182-408 (50% a.i.)		
A. Acute Testing		
1. Acute Oral (Rat) (81-1)	LD_{50} >5000 mg/kg (males and females)	IV (CAUTION)
2. Acute Dermal (Rat) (81-2)	LD_{50} >2000 mg/kg NOEL <2000 mg/kg	III (CAUTION)
3. Acute Inhalation (Rat) (81-3)	LC_{50} >4.67 mg/L (males and females)	IV (CAUTION)
4. Primary Eye Irritation (Rabbit) (81-4)	Moderate eye irritation, persisting to 72 hrs.	III (CAUTION)
5. Primary Dermal Irritation (Rabbit)	Slight dermal irritant	IV (CAUTION)
6. Dermal Sensitization Guinea Pig (81-6)	Not a sensitizer	N/A
II. Azoxystrobin Technical		
A. Acute Testing		
1. Acute Oral (Rat) (81-1)	LD_{50} >5000 mg/kg (males and females)	IV (CAUTION)

2. Acute Dermal (Rat) (81-2)	LD_{50} >2000 mg/kg	III (CAUTION)

Test Name	Results	Tox. Category
3. Acute Inhalation (Rat) (81-3)	Males: LC_{50}=0.962 mg/kg; Females: LC_{50}=0.698 mg/kg	III (CAUTION)
4. Primary Eye Irritation (Rabbit) (81-4)	Slight to moderate erythema and slight chemosis, clearing within 48 hours	III (CAUTION)
5. Primary Dermal Irritation (Rabbit) (81-5)	Slight erythema and edema	IV (CAUTION)
6. Dermal Sensitization (Guinea Pig) (81-6)	Not a sensitizer	
7. Neurotoxicity of (Rat) (81-8)	NOEL <200 mg/kg (males and females) LOEL=200 mg/kg (males and females)	No indication neurotoxicity; supplementary study

Test Name	Results	Comments
B. Subchronic Testing		
1. 90-Day Oral (Rat) Toxicity (82-1)	NOEL=20.4 mg/kg/day (males) NOEL=20.4 mg/kg/day (females) LOEL=211.0 mg/kg/ day (males and and females)	
2. 90-Day Oral (Dog)	NOEL=50 mg/kg/day (males and females)	

		LOEL=250 mg/kg/day (males and females)
3. 21-Day Dermal (Rat) (82-2)	NOEL=1000 mg/kg/day (males and females) LOEL not determined	
Test Name	Results	Comments
4. Neurotoxicity (Rat) (82-7)	NOEL=38.5 mg/kg/day (males and females) LOEL=161 mg/kg/day (males and females)	No consistent indications of treatment-related neurotoxicity; supplemental study

C. Chronic Testing

Test Name	Results
1. 2-Year Feeding (Rat) (83-1 and 83-2)	NOEL=300 ppm LOEL (males)=750 ppm LOEL (females)=1500 ppm
2. One-Year Oral (Dog) (83-1)	NOEL=25 mg/kg/day (males and females) LOEL=200 mg/kg/day (males and females)
3. 2-Year Feeding (Mice) (83-2)	NOEL=37.5 mg/kg/day (males) NOEL=51.3 mg/kg/day (females) LOEL=272.4 mg/kg/day (males) LOEL=363.3 mg/kg/day (females)
4. Teratogenicity (Rat) (83-3)	NOEL (maternal)=(Not established) LOEL (maternal)=25 mg/kg/day NOEL (developmental)=100 mg/kg/day LOEL (developmental)=100

	mg/kg/day
5. Developmental (Rabbit) (83-3)	NOEL (maternal)=150 mg/kg/day LOEL (maternal)=500 mg/kg/day NOEL (developmental)=500 mg/kg/day LOEL (developmental) >500 mg/kg/day
6. Multigeneration (males) (Rat) (83-4)	NOEL (systemic)=33 mg/kg/day LOEL (systemic)=163.2 mg/kg/day (males) NOEL (systemic)=33.2 mg/kg/day (females) LOEL (systemic)=170.6 mg/kg/day (females) NOEL (reproductive)=33 mg/kg/day LOEL (reproductive)=31.7 mg/kg/day
7. Oncogenicity Feeding (Rat) (83-5)	NOEL=18.2 mg/kg/day (males) 22.3 mg/kg/day (females) LOEL=34 mg/kg/day (males) 117 mg/kg/day (females)

D. Mutagenicity Testing

Test Name	Results/Comments
1. Mutation (Mouse (Lymphoma) (84-2)	Positive for forward gene mutation at the TK-locus in L5178 mouse lymphoma cells
2. Mutagenic Potential (S. typhimurium and E. coli) (84-2)	No evidence of induced mutant colonies over background
3. Mutation (in vitro Human Lymphocytes) (84-2)	Evidence of a concentration-related induction of chromosomal aberrations over background

4. Mutation (Mouse Micronucleus) (84-2)	No evidence of increased induction of micronuclei in either sex
5. Unscheduled DNA Synthesis (Rat Hepatocytes) (84-2)	No evidence of increased unscheduled DNA synthesis

E. Special Testing

1. Single-dose Whole Body Radiography (Rat) (85-1)	Supplementary - minor qualitative and quantitative differences in metabolites
2. Single-dose Excretion and Tissue Retention (Rat) (85-1)	
3. 14-dose Excretion and Tissue Retention (Rat) (85-1)	
4. Biotransformation (Rat) (85-1)	
5. In Vivo Percutaneous EUP Absorption (Rat) (85-2)	There was minimal percutaneous absorption

Absorbed Azoxystrobin appeared to be extensively metabolized in the rat. It is proposed that hydrolysis and subsequent glucuronide conjugation is the major metabolic pathway.

C. Risk Assessment Endpoints

Assessment	Results/Comments
1. Acute Dietary Exposure	(No appropriate endpoint)
2. Short Term Dermal Exposure	Not required

3. Intermediate Term Dermal Exposure	Not required
4. Chronic Dermal Exposure	Not required
5. Inhalation Exposure	Not required at this time
6. Reference Dose	0.18 mg/kg/day
7. Carcinogenicity Classification	Carcinogenicity not likely
8. FQPA	No identified increase in susceptibility in infants

In general, Azoxystrobin (both the Technical and the EUP) is of low to very low acute toxicity. The Technical is also of low to very low subchronic and chronic toxicity and is not likely to be a carcinogen.

The only Toxicology data gaps that exist for Azoxystrobin use on Turf are upgrading of the Acute Oral Neurotoxicity (Rat) study (GRN 81-8) and the Subchronic Neurotoxicity (Rat) study (GRN 82-7) with confirmatory data. The registrant has provided the required data to do so.

D. Residue Chemistry

Residue chemistry data were not required for this registration since there are no food uses associated with it.

E. Occupational and Residential Exposure

Occupational and residential assessments were not performed due to lack of toxicity endpoints of concern.

F. Dietary Risk

Dietary exposure assessments were not performed because the proposed registration does not contain food uses. Dietary exposure from drinking water is conservatively estimated at 10% of the RfD due to lack of data. Exposure to Azoxystrobin is therefore not expected to exceed the level of concern from use on commercial Turf and golf courses.

G. Environmental Fate Characteristics:

The Agency required a complete battery of Environmental Fate studies. The company also voluntarily submitted additional data from their internal testing to aid the Agency in understanding the fate of Azoxystrobin in the environment. The results of the required studies are as follow.

1. 161-1 Hydrolysis - Azoxystrobin will be stable to hydrolysis in aquatic environments.

2. 161-2 Photodegradation in Water - An upgradable supplemental study indicates that Azoxystrobin should photodegrade (half-life = 11 to 17 days) in aquatic environments.

3. 161-3 Photodegradation on Soil - Azoxystrobin should photodegrade (half-life = 11 days) in terrestrial environments.

4. 162-1 Anaerobic and Aerobic Soil Metabolism - An upgradable supplemental study indicates that Azoxystrobin should be moderately persistent (half-life = 72 to 164 days) in terrestrial environments.

5. (Not a Subdivision N guideline study) Microbial Effects - Ancillary data which indicate that Azoxystrobin should not affect microbe-mediated nitrogen metabolism and respiration.

6. 163-1 Adsorption and Desorption of Azoxystrobin in Soil - Azoxystrobin exhibits a range of binding affinities dependent upon soil textures. Azoxystrobin exhibits relatively low binding affinities (Kd = 1.5 to 4 ml/g) on coarse textured soils (e.g., loamy sand and sand) and higher binding affinities (Kd = 5 to 23 ml/g) on finer textured soils.

7. 163-1 Adsorption and Desorption of the Azoxystrobin Degradates R234886, R401553, and R402173 in Soil - These degradates exhibited low binding affinity (Kd generally less than 5 ml/g) in most soils. Hence, these degradates have the potential to be mobile in terrestrial and aquatic environments.

8. 164-1 Soil Dissipation - Several upgradable supplemental studies, using different soils, indicate that Azoxystrobin had a range of 50% field dissipation time (DT_{50}) of 8 to 34 days. The first-order dissipation half-life of Azoxystrobin ranged from 28 to 85 days. Major transformation products of Azoxystrobin were R230310, R234886, R401553, and R402173. Azoxystrobin and R234886 were detected up to 371 days after treatment. The transformation product R234886 was detected in deep soil layers (6 to 18 inches).

The dissipation of Azoxystrobin appears to predominantly be dependent on photodegradation and secondarily dependent on microbial metabolism. It is moderately persistent in soils under some conditions (absence of light) and shows characteristics that lead to concern that dissipation of degradates (but not parent compound) could occur in part via mobility in ground and surface waters. Upgradable supplemental field dissipation studies indicate that Azoxystrobin is relatively immobile and relatively non-persistent under actual use conditions.

Review of the Environmental Fate data requirements for Azoxystrobin use on Turf indicate that upgrading of the Photodegradation in Water (GRN 161-2), Aerobic Soil Metabolism (GRN 162-1), and Terrestrial Field Dissipation (GRN 164-1) studies, plus submission of Droplet Size Spectrum (GRN 201-1) and Drift Field Evaluation (GRN 201-2) data are necessary. The registrant has provided upgrade data for the first three studies and indicated that they will provide the latter two studies.

H. Ecological Effects Characteristics:

For Azoxystrobin Technical the Agency required a complete battery of wildlife studies and the company voluntarily ran additional studies on the parent compound and its degradates.

Test Name	Results/Comments

1. Avian Acute Oral Toxicity (LD_{50}) (71-1)
   a. Bobwhite >2000 mg/kg Practically nontoxic
   b. Mallard >250 mg/kg Not determined, study is Supplemental

2. Avian Subacute Dietary Toxicity (LC_{50}) (71-2)
   a. Bobwhite >5200 ppm Practically nontoxic
   b. Mallard >5200 ppm Practically nontoxic

3. Avian Reproduction (Chronic, TGAI) (71-4)
   a. Mallard NOEC=1200 ppm LOEC=3000 ppm
   b. Bobwhite Not determined Study invalid; data gap

Test Name	Results/Comments	
4. Mammalian Acute Toxicity (TGAI)		
a. Oral (Rat)	LD_{50} >5000 mg/kg	Practically nontoxic
5. Mammalian Chronic Toxicity (TGAI)		
a. Dietary (Rat)	NOEC=300 ppm LOEC=1500 ppm	
b. Dietary (Rabbit)	NOEC=16,500 ppm LOEC>16,500 ppm	
6. Nontarget Insect Acute Contact Toxicity (141-1)		
a. Honey Bee (TGAI)	LD_{50} >200 µ/bee	Practically nontoxic
b. Honey Bee (TEP)	LD_{50} >200 µ/bee	Practically nontoxic
7. Other Invertebrates (not required; no GRN)		
a. Earthworm (TGAI)	LC_{50}=278 mg ai/kg	
b. Hoverfly (25% ai)	Number of larva produced was significantly adversely affected at test equivalent of 0.22 lb. ai/acre	
c. Carabid beetle (23.7% ai)	No adverse effects at test equivalent of 0.22 lb. ai/acre	
8. Freshwater Fish Acute Toxicity (TGAI) (72-1)		
a. Rainbow Trout	LC_{50}=0.47 ppm	Highly toxic
b. Bluegill	LC_{50}=1.1 ppm	Moderately toxic
9. Freshwater Invertebrates, Acute (TGAI) (72-2)		
a. Waterflea	EC_{50}=259 ppb	Highly toxic
10. Freshwater Fish Early Life-stage (Chronic) Toxicity (TGAI) (72-4)		
a. Fathead Minnow	NOEC=147 ppb LOEC=193 ppb	
11. Freshwater Aquatic Invertebrates Life-cycle Toxicity (Chronic, TGAI) (72-4)		
a. Waterflea	NOEC=44 ppb LOEC=84 ppb	
12. Freshwater Organism Acute Toxicity (Degradates)		
a. Rainbow Trout	EC_{50}/LC_{50} >150 ppm	Practically nontoxic; degradate=R234886

b. Waterflea	EC_{50}/LC_{50} >190 ppm	Practically nontoxic; degradate=R234886
c. Waterflea	EC_{50}/LC_{50} >50 ppm	Slightly toxic; degradate=R401553

Test Name	Results/Comments	
12. Freshwater Organism Acute Toxicity (Degradates) (cont.)		
d. Waterflea	EC_{50}/LC_{50} >50 ppm	Slightly toxic; degradate=R402173
13. Estuarine/Marine Fish Acute Toxicity (TGAI) (72-3)		
a. Sheepshead Minnow	LC_{50}=0.67 ppm	Highly toxic
14. Estuarine/Marine Invertebrate Acute Toxicity (TGAI) (72-3)		
a. Mysid Shrimp	LC_{50}=56 ppb	Very highly toxic
b. Pacific Oyster (larvae)	LC_{50}=1300 ppb	Moderately toxic
15. Nontarget Terrestrial Plant Seedling Emergence Toxicity (Tier I, TEP) (122-1)		
a. Corn	14.4% inhibition	
b. Meadow fescue	8.6%	"
c. Purple Nutsedge	5.3%	"
d. Winter Wheat	24.6% inhibition	
e. Carrot	33.2%	"
f. Soybean	10.2%	"
g. Cocklebur	16.1%	"
h. Morning Glory	10.1%	"
i. Rape	27.2%	"
j. Sugar Beet	11.2%	"
k. Velvetleaf	14.8%	"
16. Nontarget Terrestrial Plant Vegetative Vigor Toxicity (Tier I, TEP) (122-1)		
a. Corn	8.7% inhibition	
b. Purple Nutsedge	2.9%	"
c. Winter Wheat	4.9%	"
d. Wild Oat	11.4%	"
e. Soybean	0.3%	"
f. Cocklebur	0.3%	"
g. Morning Glory	0 %	"
h. Rape	6.7%	"
j. Sugar Beet	1.3%	"
k. Velvetleaf	0.7%	"
17. Nontarget Terrestrial Plant Seedling Emergence Toxicity (Tier II, TEP) (123-1)		

a. Carrot	EC_{25}=0.59 lb ai/A
	EC_{05}=0.17 lb ai/A
b. Rape	EC_{25}=3.2 lb ai/A
	EC_{05}=0.55 lb ai/A

Test Name	Results/Comments
18. Nontarget Aquatic Plant Growth Toxicity (Tier II, TGAI) (123-2)	
a. Duckweed	EC_{50}= 3.4 ppm
	NOEC=0.8 ppm
b. Green algae	EC_{50}= 0.1 ppm
	NOEC=0.02 ppm
c. Marine diatom	EC_{50}= 0.5 ppm
	NOEC=0.1 ppm
d. Freshwater diatom	EC_{50}= 0.5 ppm
	NOEC=0.02 ppm
e. Blue-green algae	EC_{50}=13 ppm
	NOEC=9 ppm

In general, acute toxicology studies (using the TGAI) indicate that Azoxystrobin is practically nontoxic to birds, mammals, and bees; highly toxic to freshwater fish, freshwater invertebrates, and estuarine/marine fish; and very highly toxic to estuarine/marine invertebrates. Available acute toxicity on Azoxystrobin degradates indicate that R234886 is practically nontoxic to Rainbow Trout and daphnids and R401553 and R402173 may be slightly toxic to daphnids.

Acute risk estimates were derived by use of in-house modeling software. For use on Turf, no acute risk Levels of Concern (LOCs) for birds or mammals are exceeded when the maximum number of applications and maximum Estimated Environmental Concentrations (EECs) are assumed. Using the GENEEC modeling program, for fish and aquatic invertebrates the acute high risk LOCs are exceeded only for estuarine/marine invertebrates for multiple applications. However, GENEEC was not designed to model Turf uses and the estimate for estuarine/marine invertebrates is believed to be about a six-fold overestimate. Using that correction factor no acute aquatic LOCs are presumed to be exceeded for use of Azoxystrobin on Turf.

Chronic studies using the TGAI established the following respective No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) values: 300 and 1500 ppm for small mammals, with an endpoint effect of reduced pup weights; 1200 and 3000 ppm for Mallards, with an endpoint effect of reduced egg laying; and 44 and 84 ppb for freshwater fish, with an endpoint effect of number of young produced. A Maximum

Allowable Toxicant Concentration (MATC) of 168 ppb was established for freshwater fish, based on adverse effects on larvae length.

Modeling of Chronic risks indicates that the chronic LOC for birds is not exceeded by data that are currently available to the Agency, but the Bobwhite reproduction study requirement has not yet been satisfied. With mammals, using the FATE modeling program, the chronic risk to small herbivores is exceeded if the maximum number of applications and the maximum EEC are assumed but there is no exceedance if the mean EEC is assumed and no exceedance in any scenario for insectivores. Since the FATE modeling program overestimates risks for commercial Turf use, the LOC exceedance that was calculated for small herbivores is believed to be an artifact of the program rather than a real concern. Using the GENEEC model, the restricted use and endangered species LOCs are exceeded for freshwater fish, freshwater invertebrates, and estuarine/marine fish for multiple applications, and for estuarine/marine invertebrates for both single and multiple applications. However, the GENEEC modeling software is overly conservative for Turf and may provide up to a six-fold overestimate of EECs for Azoxystrobin use on this site. Therefore, the Agency believes that no acute or chronic LOCs for aquatic organisms are actually exceeded.

The only Environmental Effects data gap that exists for Azoxystrobin use on Turf is Avian Reproduction (Bobwhite) (Chronic, TGAI) (71-4). This study is being repeated by the manufacturer.

I. Performance Characteristics:

Data provided by the manufacturer indicate that end-use products (EUPs) containing Azoxystrobin provide good control of the Turf fungal pests Brown Patch, Pythium Blight, and Melting Out (Leaf Spot) but do not control Dollar Spot.

SUMMARY OF MAJOR DATA GAPS

The only **Product Chemistry** data gap that exists for Azoxystrobin use on commercial Turf is submission of a two-year Storage Stability (GRN 63-17) study. A one-year interim report has been submitted and the company has informed the Agency that the study is on-going.

The only **Toxicology** data gaps that exist for Azoxystrobin use on commercial Turf are upgrading of the Acute Oral Neurotoxicity (Rat) study (GRN 81-8) and the Subchronic Neurotoxicity (Rat) study (GRN 82-7). The registrant has provided the required data to do so.

The outstanding **Environmental Fate** requirements for Azoxystrobin use on Turf are upgrading of the Photodegradation in Water (GRN 161-2), Aerobic Soil Metabolism (GRN 162-1), and Terrestrial Field Dissipation (GRN 164-1) studies, plus the submission of Droplet Size Spectrum (GRN 201-1) and Drift Field Evaluation (GRN 201-2) data.

The only **Ecological Effects** data gap that exists for Azoxystrobin use on Turf is Avian Reproduction (Bobwhite) (Chronic, TGAI) (71-4).

LABEL REQUIREMENTS

Because the Agency feels that the Environmental Fate data submitted in support of the registration of Azoxystrobin indicate that one of its degradates has the potential, under some circumstances and in some soils, to be moderately persistent and mobile, the following groundwater statement is required on the product labeling:

> "Degradates of this chemical have properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination."

PUBLIC INTEREST FINDING

Azoxystrobin has been determined, by the U.S. Environmental Protection Agency, to be a Reduced Risk pesticide, for use on commercial Turf.

Facts favorable to Azoxystrobin are that it has low application rates and has application intervals that are comparable to or longer than most alternatives. It also has a broad control spectrum and a new mode of action that should allow it to be used in resistance management strategies and against fungi that have developed resistance to other fungicides.

Azoxystrobin is additionally of low acute and chronic toxicity to humans and is unlikely to be a carcinogen. It is also of low acute and chronic toxicity to birds, mammals, and bees.

Facts unfavorable to Azoxystrobin are that it does not control Dollar Spot, a major Turf pest. It is also highly toxic to freshwater fish and invertebrates, highly toxic to estuarine/marine fish, and very highly toxic to estuarine/marine invertebrates. Additionally, environmental fate data lead to some Agency concern that degradates of Azoxystrobin could be a threat to reach groundwater under some meteorological and soil conditions.

The risk to estuarine/marine animals from Turf use is very low, however. Further, Azoxystrobin degradates that have been tested are practically nontoxic to Rainbow Trout and only slightly toxic, at most, to daphnids. In-house modeling indicates only marginally significant risk to freshwater animals and small herbivores resulting from commercial Turf use and these are substantial overestimates of risk because the models are not

designed for Turf uses. Also, the label will contain a ground water advisory to indicate the Agency's concern about possible soil persistence and mobility of Azoxystrobin.

CONTACT PERSON AT EPA

Mailing address:

Cynthia L. Giles-Parker
Product Manager (22)
Fungicide-Herbicide Branch
Registration Division (H7505C)
Office of Pesticide Programs
Environmental Protection Agency
401 M Street, W. W.
Washington, D.C. 20460

Office location and telephone number:

Room 229, Crystal Mall #2
1921 Jefferson Davis Highway
Arlington, VA 22022
703-305-7740

DISCLAIMER: The information in this Pesticide Fact Sheet is for information only and is not to be used to satisfy data requirements for pesticide registration. The information is believed to be accurate as of the date on the document.