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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Metabolism Assessment Review Committee (MARC) Meeting

SUBJECT: **Trifloxystrobin (Chemical: 129112): New Registration**
Draft Environmental Fate Profile/Drinking Water Assessment

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SUMMARY

Trifloxystrobin is immobile in soils and degrades rapidly in soil and aquatic environments to a series of minor degradates and isomers and the primary degradate, CGA 321113. CGA-321113 appears to be a mobile and persistent degradate that can be further degraded but at slower rate than the parent compound.

Drinking Water Concentrations

Trifloxystrobin

Surface Water Estimated Concentrations: Peak: 5.29 - 5.56 ppb
56-day Average: 0.64 - 2.97 ppb

Ground Water Estimated Concentrations: ~~0.00093 ppb~~ 5.06 ppb

Primary Metabolite: CGA321113

Surface Water Estimated Concentrations: Peak: 47.98 ppb
56-day Average: 47.31 ppb

Ground Water Estimated Concentrations: 5.2 ppb

ENVIRONMENTAL FATE SUMMARY

Based on a preliminary review of environmental fate data, the major routes of dissipation for trifloxystrobin appear to be associated with microbial-mediated metabolism, alkaline-catalyzed hydrolysis, photodegradation, and soil binding. Abiotic degradation of trifloxystrobin appears to be dependent on alkaline catalyzed hydrolysis (pH 9; $t_{1/2}$ = 19.8 hours) and photoinduced isomerization ($t_{1/2}$ ranges from 2 to 14.8 days) in soil and water environments. Trifloxystrobin degrades rapidly ($t_{1/2}$ = 0.5 to 2 days) in aerobic soil environments. More rapid degradation of trifloxystrobin ($t_{1/2}$ =0.60 days) was observed in aquatic environments. A primary degradate of trifloxystrobin is identified as CGA-321113, a carboxylic acid. The remaining portion of the trifloxystrobin molecule (base structure of two phenyl groups) appears to form minor degradates, bound residues, and CO_2. Trifloxystrobin is expected to be relatively immobile in soil (Koc = 2709) Volatilization is not a likely route of dissipation because of low vapor pressure.

The registrant reported that trifloxystrobin demonstrated a biphasic degradation pattern in field dissipation studies in California, New York, and Georgia. For the first degradation phase trifloxystrobin half-life values ranged from 1.9 to 24 days. In the second degradation phase, trifloxystrobin had half-life values ranging from 6.5 days to 4 months.

The registrant reported that trifloxystrobin has bioconcentration factors in bluegill sunfish of 131X in edible tissues, 835X in nonedible tissues, and 431X in whole fish. The bioaccumulation plateau was rapid (3 days after exposure). Bioaccumulated residues were rapidly eliminated (DT_{90} < 80 days). The registrant believes that trifloxystrobin has low potential for accumulation because of low persistence in soil and aquatic laboratory studies and high rate of depuration. EFED notes that bioaccumulated residues were not identified.

A recently submitted Reduced Risk Rationale document, dated February 10, 1999, provides additional information on trifloxystrobin degradates. In soils, trifloxystrobin is transformed to CGA-321113, minor degradates (CGA-373466, CGA-357276), and CO_2. In water, trifloxystrobin hydrolyzes to CGA-321113. During aqueous photolysis trifloxystrobin is degraded to parent isomer products (CGA-357261, CGA-357262). During soil photolysis, CGA-321113 and the parent isomer CGA-357261 are formed. Further degradation forms CGA-357276, CGA-373466, CO_2 and bound residues.

Information is also provided on the mobility of the primary degradate, CGA-321113. The laboratory adsorption/desorption mobility classification of CGA-321113 was medium to very highly mobile. In aged column leaching studies, CGA-321113 was detected in three of the seven soils tested (3.9 to 30.9% of the applied amount); however, in leachates from a field lysimeter study, CGA-321113 was not detected above 0.02% of the applied amount. In field dissipation studies, conducted in Georgia, California, and New York , under bareground and cropped conditions, trifloxystrobin was not detected below 6" and CGA-321113 concentrations reached or were slightly above the screening level (LOQ of 10 ppb) in 12-18, and 30 -36 inch soil segments. Another degradate CGA-373466 was detected in the 0-6 and 6-12 inch segments.

Adsorption/desorption studies were also conducted for the parent isomer CGA-357261 and CGA-373466 (an isomer of CGA-321113). The mobility classification of CGA-357261 was medium to low. The mobility classification of CGA-373466 was medium to very high. CGA-357261 and CGA-373466 demonstrated instability in microbially active soils.

Preliminary evaluation of these data, indicate that trifloxystrobin is immobile and degrades rapidly in the environment to a series of isomers and the primary degradate CGA 321113. CGA-321113 appears to be a mobile degradate that can be further degraded but at slower rate than the parent compound. Depending on the specific fate studies submitted in support of the trifloxystrobin registration, additional fate studies may be required to better evaluate the persistence and mobility of the primary degradate, CGA-321113.

DRINKING WATER ASSESSMENT

Introduction

This assessment provides Tier I estimated drinking water concentrations for trifloxystrobin when used for non-crop uses (turf) at an maximum single application rate of 0.34 lbs a.i/A (maximum yearly application permitted1.08 lbs ai/A) based on GENEEC (surface water) and SCI-GROW (ground water) screening models.

The primary use of these models is to provide a coarse screen for sorting out pesticides which OPP has a high degree of confidence that the actual concentrations of the pesticide in drinking water will be less than the human health drinking water level of concern (DWLOC). A human health DWLOC is the concentration of a pesticide in drinking water, which when combined in aggregate with exposure in food and other non-occupational exposures would result in an acceptable aggregate risk. It is effectively an upper limit on the concentration of a pesticide in drinking water when combined with exposure from other sources.

Note on Model Scenarios

Trifloxystrobin is labeled for both crop and non-crop uses. According to the most recently submitted labels, the maximum application rate for crop use is in cucurbit vegetables (0.125 lbs a.i./A/application; maximum yearly application of 1.0 lbs a.i./A). The maximum single application use rate for non-crop applications (turf) is 0.34 lbs a.i./acre/application with a maximum of 1.08 lbs a.i./acre/year. Although the yearly use rates are similar for these two uses, modeling results (based on use profile and fate characteristics) indicate that turf use has the higher potential to contaminate surface and ground water supplies.

SURFACE WATER : GENeric Expected Environmental Concentration (GENEEC)

GENEEC (GENeric Expected Environmental Concentration) is a screening model that provides an upper-bound estimate of a pesticide's concentration in a 1 ha pond resulting from surface

water runoff from a 10 ha field after an application of the pesticide at the highest labeled seasonal use rate. The model assumes that a runoff event occurs two days after the last application of the pesticide, and that 10% of the remaining pesticide application is transported from the field and into the pond. Spray drift equal to 1% of the ground application and 5% of aerial application of the pesticide is also assumed to enter the pond. The site modeled is considered a high exposure site for surface water runoff events, and is based on a site representing a clay soil in Georgia with high runoff potential. Once the pesticide has been transported to the pond, the model allows for degradation of the pesticide via a laboratory-determined aerobic aquatic or soil metabolism half-life, and partitioning of the pesticide between pond sediment via a laboratory-determined K_{oc} or K_d value. GENEEC provides a maximum and a 56-day average concentration value for pesticide concentrations. Note that GENEEC is a subset of the PRZM/EXAMS model.

Trifloxystrobin GENEEC Estimates

The GENEEC model requires several environmental fate inputs, including an input value for the aerobic aquatic metabolism half-life parameter. This value is especially important in the estimation of water concentrations other than peak concentrations (chronic values). At present the trifloxystrobin environmental fate database does not include a fully acceptable aerobic aquatic metabolism half-life value. Therefore, based on EFED guidance, two different approaches have been used to estimate this value. EFED guidance states that "In the case where there is no [acceptable] aerobic aquatic metabolism data and the hydrolysis rate is stable, estimate the aerobic aquatic metabolism half life as double the aerobic soil metabolism half-life "(Guidance for Chemistry and Management Practice Input Parameters For Fate and Transport Modeling in the Office of Pesticide Programs, WQTT, 9/30/98, Chapter 5 ("WQTT Guidance Document")). A second option is to 'enter a value of "0" if there is no aerobic aquatic metabolism data available' (Ron D. Parker and Daniel D. Rieder. April 5, 1995. The Generic Expected Environmental Concentration Program, GENEEC. Part B - User's Manual). The use of the first option is supported by information indicating that trifloxystrobin would not be expected to remain stable in aquatic environments and especially in microbially active environments (see aerobic metabolism studies and anaerobic aquatic metabolism study). The second option assumes that trifloxystrobin is stable in the aquatic environment and provides a more conservative estimate.

A suitable aerobic metabolism value is available ($t_{1/2}$ = 2.4 days). Following the guidance in Chapter 5 of the WQTT Guidance Document an aerobic aquatic metabolism half-life value of 4.8 days is estimated. Following the GENEEC User's manual guidance a default value of "0" days is used.

THE GENEEC model was run under these two assumptions (see attachment for input parameter values). As a consequence, two sets of surface water concentration estimates are provided. As expected, peak concentrations are similar under both assumptions; however, chronic concentrations are lower when using an aerobic aquatic metabolism half-life of 4.8 days due to the degradation of trifloxystrobin over time. GENEEC estimates represent an upper bound on the maximum and average concentrations of trifloxystrobin in surface waters as a result of this use.

Trifloxystrobin Estimated Surface Water Concentrations

Crops/ Application Rate	aerobic aquatic metabolism $t_{1/2}$ (days)	Maximum Concentration (ppb)	56-Day Average Concentration (ppb)
Non-crop Areas - Turf 0.34 lbs ai/A/application 1.02 lbs ai/A/yr	0	5.56	2.97
	4.8	5.29	0.64

Degradate GENEEC Estimates

The primary degradate of trifloxystrobin in both soil and aquatic environments is CGA321113 ((E, E)-α-(methoxyimino)-2-[[[[1-[3-(trifluoromethyl)phenyl]ethylidene]amino] oxy]methyl]benzeneacetic acid). This degradate is formed at a high percentage of the parent, is persistent (soil half-life = 301 days), highly soluble (30.9 ppm), mobile in the soil environment (minimum soil Koc = 49, median soil Koc = 127) and stable to hydrolysis. Additional fate data is not available. Based on the available fate data and assuming 100% conversion from the parent the following EECs are estimated for this degradate:

CGA321113 Estimated Surface Water Concentrations

Crops/Application Rate	Maximum Concentration (ppb)	56-Day Average Concentration (ppb)
Non-crop Areas - Turf 1.02 lbs ai/A/yr	47.98	47.31

A Note on Low pH Environments

It should be noted that under some low pH conditions (≤ 5), trifloxystrobin may be more stable and persistent. Estimates of trifloxystrobin concentrations in low pH environments are difficult to determine without additional fate studies conducted under low pH regimes.

GROUND WATER: Screening Concentration In GROund Water (SCI-GROW)

SCI-GROW (Screening Concentration In GROund Water) is an empirical screening model based on actual ground water monitoring data collected from small-scale prospective ground water monitoring studies for the registration of a number of pesticides that serve as benchmarks for the model. The current version of SCI-GROW provides realistic estimates of pesticide concentrations in shallow, highly vulnerable ground water (i.e., sites with sandy soils and depth to

ground water of 10 to 20 feet). There may be exceptional circumstances under which concentrations of a pesticide may exceed the SCI-GROW estimates; however, such exceptions should be rare since the SCI-GROW model is based exclusively on ground water concentrations resulting from studies conducted at sites (shallow ground water and coarse soils) and under conditions (high irrigation) most likely to result in ground water contamination. The ground water concentrations generated by SCI-GROW are based on the largest 90-day average concentration recorded during the sampling period. Because of the conservative nature of the monitoring data on which the model is based, SCI-GROW provides an upper bound estimate of pesticide residues in water. Because of the belief that pesticide concentrations in ground water do not fluctuate widely, SCI-GROW provides one concentration estimate to be used as a maximum and an average pesticide concentration value in ground water.

Trifloxystrobin SCI-GROW Estimates

Trifloxystrobin Estimated Ground Water Concentrations *

Application Rate	Concentration in Ground Water (ppb)
1.02 lb a.i./A/yr	0.0009

Trifloxystrobin does not have the environmental fate characteristics associated with a compound that could leach to ground water. The concentration estimated in ground water is 0.0009 ppb. This estimate is based on a maximum application rate of 1.02lbs/A/year, an aerobic soil half-life of 2.4 days, and a median soil organic carbon partition coefficient (K_{oc}) of 2709 l/kg. When the lowest reported K_{oc} is used (941) the estimated ground water concentration is 0.012 ppb. The estimate from SCI-GROW represents an upper bound on the concentration of sulfosulfuron in ground waters as a result of agricultural use.

Degradate SCI-GROW Estimates

The primary degradate, CGA321113, has environmental fate characteristics that indicate a potential for significant downward movement and possible contamination of groundwater. SCI-GROW estimates indicate that this compound could leach into ground water supplies.

CGA321113 Ground Water Estimated Concentrations

Application Rate	Concentration in Ground Water (ppb)
1.02 lb a.i./A/yr	5.2

13544

R127692

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