

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
PESTICIDES AND  
TOXIC  
SUBSTANCES

**MEMORANDUM**

DATE: July 20, 1994

TO: Dan Rieder  
Ecological Effects Branch  
Environmental Fate and Effects Division

FROM: Ronald Parker, Ph.D., Environmental Engineer  
Surface Water Section *R. Parker*  
Environmental Fate and Ground Water Branch

THROUGH: Henry Nelson, Ph.D., Head *H. Nelson*  
Surface Water Section  
Environmental Fate and Ground Water Branch

Henry Jacoby, Chief *Henry Jacoby 8/4/94*  
Environmental Fate And Ground Water Branch  
Environmental Fate and Effects Division

Attached, please find the EFGWB review of EEB position on Karate on turf, trees and ornamental gardens.

Product Name: Karate

Common Name: λ-Cyhalothrin

Type of Product: Insecticide

Company Name: Zeneca

Chemical #: 128867

DP Barcode: D203512

Purpose: To review EEB position paper on Karate use on turf, trees and ornamental gardens.

The review is complete and comprehensive and covers intended uses under this label. We concur with this analysis and support its conclusions.

Based upon this work, we do not believe that conducting a more refined modelling analysis would be of additional value.

DP Barcode : D159326  
 PC Code No : 128867  
 EEB Out :

To: George LaRocca  
 Product Manager 13  
 Registration Division H7505C

From: Anthony F. Maciorowski, Chief  
 Ecological Effects Branch/EFED (H7507C)

Attached, please find the EEB review of...

Reg./File # : \_\_\_\_\_  
 Chemical Name : Cyhalothrin  
 Type Product : Insecticide  
 Product Name : Karate  
 Company Name : Zeneca Inc.  
 Purpose : Assess risk from use on turf, trees and  
ornamental gardens.

Action Code : 100 Date Due : \_\_\_\_\_  
 Reviewer : R. Hitch Date In EEB: 12/12/90

EEB Guideline/MRID Summary Table: The review in this package contains an evaluation of the following:

GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT	GDLN NO	MRID NO	CAT
71-1(A)			72-2(A)			72-7(A)		
71-1(B)			72-2(B)			72-7(B)		
71-2(A)			72-3(A)			122-1(A)		
71-2(B)			72-3(B)			122-1(B)		
71-3			72-3(C)			122-2		
71-4(A)			72-3(D)			123-1(A)		
71-4(B)			72-3(E)			123-1(B)		
71-5(A)			72-3(F)			123-2		
71-5(B)			72-4(A)			124-1		
72-1(A)			72-4(B)			124-2		
72-1(B)			72-5			141-1		
72-1(C)			72-6			141-2		
72-1(D)						141-5		

Y=Acceptable (Study satisfied Guideline)/Concur  
 P=Partial (Study partially fulfilled Guideline but additional information is needed)  
 S=Supplemental (Study provided useful information but Guideline was not satisfied)  
 N=Unacceptable (Study was rejected)/Nonconcur

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

MEMORANDUM

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

SUBJECT: EFED Position on Risk from Cyhalothrin on Ornamental  
and Turf Use Sites D159326

FROM: Henry M. Jacoby, Chief  
Environmental Fate and Groundwater Branch  
Environmental Fate and Effects Division, H7507C

Anthony F. Maciorowski, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division, H7507C

TO: George LaRocca, PM  
Insecticide/Rodenticide Branch  
Registration Division H7505C

The EFED was asked to evaluate the potential risk from use of cyhalothrin on turf, trees, nurseries and ornamental gardens.

Conclusion:

The use of cyhalothrin on turf, trees, nurseries and ornamental gardens is unlikely to have significant adverse effects on the ecosystem on a regional or national scale. However, acute effects to estuarine invertebrates are likely on a limited and local scale. Chronic effects to aquatic invertebrates may also occur. To reduce, but not eliminate this risk potential, the following labeling precaution is recommended:

"Use of this pesticide adjacent to water may affect aquatic organisms. To protect these organisms, avoid applying this pesticide within 25 feet of ponds, lakes, streams, estuaries and marine habitats."

In addition to this labeling, the user could be advised to use only the lower use rate (0.015) near streams, ponds, lakes and estuaries and marine habitat.

Effects to endangered species are unlikely.

Risk Assessment

To understand the ecological risk potential from this proposed use, the exposure potential, the type of habitat involved, the size of treatment plots, and the extent of acreage involved should be considered.

Proposed Use: Cyhalothrin is proposed for use at 0.015 to 0.030 lb ai/acre.



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contains at least 50% recycled fiber

**Exposure:** The refined models EFED typically uses to provide exposure estimates for pesticides do not apply well to ornamental and nursery use sites. The nature of these use sites are such that exposure would be highly variable: A preliminary estimate based on the KOC was calculated (see Attachment I). However, this probably represents maximum exposure potential, and other factors affecting runoff should be considered.

**Types of Habitat:** The types of aquatic habitat subject to exposure may occasionally be natural water bodies like streams that flow through golf courses or parks or estuaries adjacent to these sites. But often, in these settings, the waters are manmade ponds and lakes constructed and/or managed for recreational and aesthetic purposes.

**Size of Use Sites:** Occasionally, a turf site may be a rather extensive golf course or park with 10's of acres potentially subject to treatment. More often, the use site will be much smaller, such as a small nursery setting, an ornamental garden, or widely scattered plots of ornamental trees. This reduces the amount of pesticide available to runoff in a given drainage basin.

**Extent of Acreage:** On the whole, compared to major crops, the acreage potentially treated under this label will be small.

**Risk to Terrestrial Organisms:** Adverse effects to bird and mammals are not expected because cyhalothrin is not particularly toxic to these groups relative to the low use rate.

**Exposure to Aquatic Organisms:** The use of cyhalothrin on ornamentals and turf at 0.015 to 0.030 lb ai/acre is expected to occasionally result in drift or runoff to adjacent aquatic habitat. Based on the preliminary EEC, the exposure from such usage could range from 14 to 32 pptr depending on the use rate and timing of the first runoff event after application.

Exposure from 0.015 lb ai/acre would be 14 and 16 pptr, assuming runoff occurred 7 days or 1 day after application, respectively.

Exposure from 0.030 lb ai/acre would be 28 and 32 pptr, assuming runoff occurred 7 days or 1 day after application, respectively.

#### Acute Risk

The LC50's for cyhalothrin on representative aquatic organisms, and the associated risk quotients based on the preliminary exposure estimates are presented below:

	<u>LC50/EC50</u>	<u>RO (0.015 lb/acre)</u>	<u>RO (0.03 lb/acre)</u>
Bluegill	210 pptr	0.07 (16 pptr/210)	0.15 (32 pptr/210)
Sheepshead minnow	807 pptr	0.02 (16 pptr/807)	0.04 (32 pptr/807)
Daphnia magna	360 pptr	0.04 (16 pptr/360)	0.09 (32 pptr/360)
Shrimp	4.9 pptr	3.26 (16 pptr/4.9)	6.53 (32 pptr/4.9)

The LOC's for aquatic organisms against which these risk quotients will be compared are:

<u>LOC</u>	<u>Risk Presumption</u>
0.5	High acute risk
0.1	Restricted use
0.05	May affect to endangered species

The risk quotients for fish and freshwater invertebrates from the lower use rate (0.015 lb ai/acre) do not exceed the LOC for high acute risk or restricted use (0.5 and 0.1 respectively). The risk quotients for fish and freshwater invertebrates from the higher use rate exceed the LOC for restricted use (0.1), but not the LOC for high acute risk (0.5).

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The risk quotient for shrimp from both the low and high use rate exceeds the LOC's indicating a potential for high acute risk to estuarine and marine invertebrates.

Restricted use is triggered based on the acute risk calculated above.

#### Chronic Risk

Two studies with aquatic invertebrates (*Daphnia magna*) provide chronic effects data. One supplemental study indicates a NOEL and LOEL of 8.5 and 18.3 pptr, respectively. A second life cycle study indicates a NOEL and LOEL of 1.98 and 3.5 pptr, respectively. A fathead minnow study indicates a chronic NOEL of 31 pptr and 62 pptr, respectively.

Immediate exposure levels exceed the aquatic invertebrate chronic NOEL and LOEL indicating a potential for chronic risk. The highest calculated concentrations barely exceed the fish NOEL. Chronic risk to fish is possible, but not probable. Risk reduction for chronic effects is recommended for aquatic invertebrates, but not for fish. See the conclusions above for recommended labeling.

**Discussion of Risk:** Based on available information, this proposed use pattern is **not likely to cause fish kills.**

The risk described above indicates that cyhalothrin may occasionally affect freshwater and estuarine invertebrates. The apparent potential risk is tempered by the following factors:

1-Runoff in turf sites is often reduced because of thick grass that acts as a vegetative buffer strip and intercepts surface water contaminants.

2-Drift is less of a problem since application is likely to be with ground equipment.

3-The potential exposure may be less in estuaries where the tidal flow will, in a matter of 6-12 hours, dilute and/or move the pesticide to larger water bodies where concentrations will be reduced to levels not representing risk. Note that this movement and dilution is not expected to be quick enough to avoid all acute risk, but it should lessen it and reduce chronic exposure substantially.

4-Because turf, trees, nurseries and ornamental gardens sites comprise relatively limited acreage on a regional and national scale, the overall impact to the environment will be low from this use.

5-The chronic risk identified above is possible, but of lower significance because Cyhalothrin binds quickly to suspended particles in water. When this occurs, it is less available to have an adverse affect on organisms and chronic exposure will be reduced.

Notwithstanding the above factors, the significance of the risk could be great in local areas, especially near estuaries. It is this risk that the recommended labeling is primarily aimed at reducing.

Endangered Species:

Adverse effects to endangered bird and mammal species are not expected.

The LOC for aquatic organisms is exceeded based on the exposure scenario of 10 acres draining into a 1 acre pond 6 feet deep. The risk quotient exceeded the LOC for endangered fish and invertebrates by factors of 3 and <1, respectively; this is not considered a large margin when the following factors are taken into consideration:

1-Typical usage under this proposal will not involve a treatment of 10 contiguous acres, so the associated concentration of the pesticide in surface water, as assumed in the hypothetical exposure scenario, will occur infrequently. If large contiguous tracts are treated, they would be heavily grassed; this would be the equivalent of a vegetated filter that would significantly reduce the potential runoff of a pesticide like cyhalothrin which has a high tendency to bind to organic matter.

2-The recommended 25-foot buffer would further reduce the potential for transport of cyhalothrin into surface waters where endangered aquatic species may occur.

3-Aerial application, which would result in drift (a major route of exposure for synthetic pyrethroids), is not a typical method of application for this proposed use pattern.

Because of these factors this proposed use is unlikely to affect endangered aquatic organisms.

If you have questions, please contact Dan Rieder or Robert Hitch of EEB or Henry Nelson of EFGB.



ATTACHMENT I: PRELIMINARY EEC FOR CYHALOTHRIN ON TURF, TREES, NURSERIES AND ORNAMENTAL GARDENS AT 0.015 TO 0.03 LBS AI/ACRE

ASSUMES: GROUND APPLICATION, NO INCORPORATION

RUN No. 1 FOR CYHALOTHRIN		INPUT VALUES		
APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
.030	14.0	1.0	100000.0	1.0

THE PRELIMINARY EEC VALUE IS 32.5 PPT

RUN No. 2 FOR CYHALOTHRIN		INPUT VALUES		
APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
.030	14.0	7.0	100000.0	1.0

THE PRELIMINARY EEC VALUE IS 28.5 PPT

RUN No. 3 FOR CYHALOTHRIN		INPUT VALUES		
APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
.015	14.0	1.0	100000.0	1.0

THE PRELIMINARY EEC VALUE IS 16.2 PPT

RUN No. 4 FOR CYHALOTHRIN		INPUT VALUES		
APPLICATION RATE (LBS/ACRE)	HALF-LIFE (DAYS)	DAYS TO RUNOFF	SOIL KOC	SOLUBIL (PPM)
.015	14.0	7.0	100000.0	1.0

THE PRELIMINARY EEC VALUE IS 14.2 PPT