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DP Barcode : D190191
PC Code No : 109303
EEB Out : MAY 6 1993

To: REBECCA COOL
Product Manager 41
Registration Division (H7505C)

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

Attached, please find the EEB review of...

Reg./File # : 93WA0015
Chemical Name : ES-FENVALERATE
Type Product :
Product Name :
Company Name : WASHINGTON DEPT OF AGRI
Purpose : REVIEW PROPOSAL TO EXEMPT ES-FENVALERATE FOR THE SEVENTH YEAR, DETERMINE POTENTIAL FOR ENDANGERED SPECIES EFFECTS AS WELL AS NON-ENDANGERED SPECIES
Action Code : 510 Date Due : 5-3-93
Reviewer : MIKE REXRODE Date In EEB: 4-19-93

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

DP BARCODE: D190191

CASE: 284600 | DATA PACKAGE RECORD | DATE: 04/13/93
SUBMISSION: S438677 | BEAN SHEET | Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: EMERGENCY EXEMP   ACTION: 510 SEC18-OC F/F USE
CHEMICALS: 109303 S-Fenvalerate %

ID#: 93WA0015
COMPANY:
PRODUCT MANAGER: 41 REBECCA COOL   703-308-8417   ROOM: CS1
PM TEAM REVIEWER: LIBBY PEMBERTON   703-308-8326   ROOM: CS1
RECEIVED DATE: 04/12/93   DUE OUT DATE: 06/01/93

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 190191   EXPEDITE: N   DATE SENT: 04/13/93   DATE RET.: / /
CHEMICAL: 109303 S-Fenvalerate
DP TYPE: 001 Submission Related Data Package
ADMIN DUE DATE: 05/03/93   CSF: N   LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	4/15/93	/ /
BRAN: EEB	4/16/93	/ /
SECT:	/ /	/ /
REVR :	/ /	/ /
CONTR:	/ /	/ /

* * * DATA REVIEW INSTRUCTIONS * * *

This is the seventh yr this use has been requested. EEB last reviewed in April 1990, please update.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
190189	BAB	04/13/93	05/03/93	Y	N	N
190190	EAB	04/13/93	05/03/93	Y	N	N

100.1 **Submission Purpose**

The Washington Department of Agriculture is requesting an emergency exemption (Section 18) for the use of ASANA 1.9 EC or ASANA XL to control black vine weevils on cranberries.

100.2 **Application Rate/Method/Directions**

ASANA is to be applied post-bloom by ground sprayer at not more than 2 applications per year. The compound is expected to treat 500 acres at a maximum rate of 0.05 lb ai/A.

100.3 **Target Organisms**

Black vine weevil, Otiorhyncus sulcatus (fabricius)

100.4 **Precautionary Labeling**

This pesticide is toxic to wildlife and extremely toxic to fish. Use with care when applying in areas adjacent to any body of water. Do not apply directly to water. Do not apply when weather conditions favor drift from treated areas. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label.

101.0 **Hazard Assessment**

The State of Washington is requesting an emergency exemption for the use of ASANA on cranberry fields to combat black vine weevil. This request is only for dry harvested fields and not for bogs that are flooded at harvest.

101.1 **Likelihood of Adverse Effects to Nontarget Organisms**

Aquatic Toxicity Laboratory Studies

Fenvalerate is the parent compound of esfenvalerate, the active 2S,aS isomer. Information pertaining to both compounds will be used interchangeably in this report because of their similarities in fate and toxicity. Fenvalerate is a second generation pyrethroid that degrades in soil with a half-life of six months and undergoes hydrolysis after 24 days at pH 7.2. Fenvalerate is highly lipophilic and strongly binds to sediment/particulate resulting in a soil/water partition coefficient of greater than 15,000. Fenvalerate is a neurotoxicant and effector of ion permeability, (Miller and Adams 1982) and may interact with sodium gates (Lawrence and Casida 1983). Laboratory testing has shown that fenvalerate is very highly toxic to freshwater aquatic organisms with acute toxicity values that range from 0.032 ug/L (Daphnia magna) to 2.35 ug/L (fathead minnow) (Mayer and Ellersieck 1986). This very high toxicity has also been documented in acute marine studies. Schimmel et al. (1983) found that fenvalerate was acutely toxic to mysid shrimp, Mysidopsis bahia at 0.008 (0.005 - 0.01) ug/L and pink shrimp, Penaeus duorarum at 0.84 (0.66 - 1.2) ug/L. They further found that acute toxicity values for estuarine fish ranged from 5.0 (0.55 - 5.3) ug/L sheepshead minnow, Cyprinodon variegatus, and 0.31 (0.21 - 0.40) ug/L for Atlantic silversides, Menidia menidia.

An evaluation of sublethal fenvalerate exposure to aquatic invertebrate larval development and metabolism was conducted by McKenney and Hamaker (1984). They concluded that exposure to 0.0001 and 0.0002 ug/L can result in alterations of metabolic-salinity patterns of larval grass shrimp, Palaemonetes pugio. This effect reduces the homeostasis at a critical life stage by limiting the organisms capacity to adapt to fluctuating salinity conditions that are normally encountered in estuarine waters.

Esfenvalerate Field and Mesocosm Studies

In order to help determine affects of esfenvalerate / fenvalerate to aquatic systems, field studies in the form of mesocosms have recently been employed. Lazano et al. (1992) evaluated the effects of esfenvalerate in 12 littoral enclosures (5x10 m) in a 2-ha pond near Duluth, Minnesota, at six nominal concentration levels (0, 0.01, 0.08, 0.2, 1, and 5 ug/L). During the eight week exposure they found that esfenvalerate residues (1 to 5 ug/L) resulted in drastic reduction of most aquatic crustaceans, chironomids, juvenile bluegills (Lepomis macrochirus), and larval fish. Microinvertebrate populations (copepods) and certain aquatic insect genera declined at esfenvalerate levels of 0.08 to 0.2 ug/L. According to Lazano et al. (1992), esfenvalerate concentrations of 1 ug/L are expected in the water column under normal use conditions that can result in the reduction of aquatic organism populations. Esfenvalerate exposure in the water column resulted in a 90% loss of the chemical after 2 to 4 days (adsorption to organic material). However, for most aquatic organisms in the littoral zone, esfenvalerate acute effects can be expected to occur in the first 4 days. However, in contrast to water column levels, sediment concentrations of the compound were found to be at 1 and 10 ug/g dry weight after 16 days. Heinis and Knuth (1992) found that esfenvalerate residues accumulated in the sediment after multiple applications and could result in exposure of the compound to substrate-dwelling organisms. Food chain effects of esfenvalerate to aquatic organisms were shown by Coats et al. (1989) after evaluating dietary exposure of esfenvalerate to mosquito larvae.

Scott et al. (1989) noted that fenvalerate concentrations in runoff (0.107 ug/L) from a sugarcane-insect IPM system resulted in 50-100% mortality to caged fish (Fundulus heteroclitus, Mugil cepalus) and shrimp (Penaeus sp., P. pugio). Although the toxicity of fenvalerate in the water column may be decreased by sorption to sediment, Coulon (1982) found that this reduction was only 2-fold, and does not eliminate aquatic hazard. Scott et al. (1989) found that sediment-bound fenvalerate ranging in concentration from 22.5 - 90 ug/kg (ppb) resulted in a significant reduction in the incidence of egg production and the number of eggs produced per gravid female in the benthic copepod, Paroychocamptus wilsoni and Microarthridion littorale.

Webber et al. (1992) used twelve 0.1-ha ponds constructed in Alabama to evaluate the affects of esfenvalerate on an aquatic mesocosm with defined littoral and limnetic zones. Treatments (low, medium, high) consisted of 10 weekly drift and five biweekly runoff events of formulated esfenvalerate (ASANA XL 0.66 EC) that simulated actual application rate, as well as, 0.2% and 20% of application. As noted in other studies, initial pesticide applications resulted in pulse loads with declining water concentrations after 24 hr. However, limited data on residues in the water column (collected one day after each application and averaged over 35 days) showed a value of 0.18 ppb for the medium application level (actual rate used on cotton). Webber et al. (1992) found that during the ten week esfenvalerate application, microinvertebrates exposed to this medium concentration level underwent significant reduction in numbers while bluegill young showed a decline in biomass. If we assume a balanced pond/estuary ecosystems where several aquatic species and life stages are competing for similar resources, an effect on invertebrate numbers could place certain organisms at a disadvantage that may result in their decline.

The Ecological Effects Branch (EEB) has calculated estimated environmental concentrations (EEC) of ASANA residues on cranberries following ground application (Appendix I). These calculations suggest that at 0.05 lb ai/A (highest application level) the expected concentration of ASANA from this type of application is 0.03 ug/L. A comparison of this estimate with acute and chronic toxicity values suggests that ASANA use on cranberries may result in environmental residues that exceed aquatic toxicity concerns, especially to aquatic invertebrates, through runoff from fields adjacent to aquatic systems.

Avian Toxicity

The available data suggests that fenvalerate is practically non-toxic to birds at an acute level (Mallard LC_{50} = 10,000 ppm). However, avian reproductive effects were found at 25 ppm. In assessing acute toxicity of ASANA to avian wildlife, EEB has estimated the potential exposure from residues by using Hoerger and Kenaga (1972) table of typical maximum residues on differing categories of vegetation (Table 1).

Table 1. Maximum Expected Fenvalerate Residues on Avian Food and Dietary Intake (ppm) after an Application of 0.05 lb ai/A

Food Type	Reside (ppm)
Short Grass/ Dense Foliage	14.0
Small Insects	2.8
Large Insects	0.1

The maximum expected residues from the consumption of vegetation and insects (application rate of 0.05 lb ai/A) are expected to range from 0.1 to 14.0 ppm. These values show that ASANA use on cranberries should not present a direct toxicity threat to birds since the expected residues are 6 to 3 orders of magnitude less than avian toxicity values. However, there is a possibility of indirect effects through ASANA exposure to aquatic invertebrates that serve as a food base for waterfowl. Since, ASANA is very toxic to aquatic organisms, runoff from sprayed fields could affect a significant trophic level that certain waterfowl are dependent upon, especially during breeding.

ASANA has the potential for toxic impact of aquatic ecosystems, as well as, causing indirect effects to waterfowl. However, EEB believes that the emergency use described by the Washington Department of Agriculture should not result in a significant incremental risk to aquatic systems because of a limited exposure resulting from the following considerations: 1) only 500 acres to be sprayed; 2) no direct contact with aquatic environment (dry harvested cranberry fields will be sprayed and not bogs that are flooded; 3) minimum risk of pesticide impacting aquatic system via drift (only ground application to be used). These factors appear to mitigate potential exposure of ASANA to wildlife and aquatic organisms.

101.2 **Endangered Species**

Based upon the information found in the EEB Endangered Species file, no endangered species should be impacted by this use of ASANA in the designated counties of Pacific and Grays Harbor.

107.0 Conclusions

EEB has completed its evaluation of this Section 18 request for the use of ASANA on cranberry in Washington. Expected environmental residues were calculated in order to assess the potential hazard of ASANA to avian and aquatic species. The expected residues from field runoff exceed acute/chronic toxicity values for fish and aquatic invertebrates by one to three orders of magnitude. However, EEB believes that the emergency use described by the Washington Department of Agriculture should not result in a significant incremental risk to wildlife and aquatic organisms because of a limited exposure potential that reflects the following considerations: 1) only 500 acres are to be sprayed; 2) no direct contact with aquatic environment is expected (dry harvested cranberry fields will be sprayed and not bogs that are flooded; 3) minimum risk via drift (only ground application to be used). Although, ASANA has the potential for toxic impact of aquatic ecosystems, as well as, causing indirect effects to waterfowl, the factors previously outlined in this paper should mitigate any risk with regard to this emergency use.

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Appendix I - EEC Calculations for ASANA Use on Cranberries

I. Ground Application

Assumptions:

0.1% runoff
10 acre drainage basin
0.05 lb ai/A of ASANA

(A) Runoff

0.05 lb ai/A x 0.001 x 10 A = 0.0005 lbs ai total runoff

EEC of 1 lb ai, direct application to 1 A pond, 6-ft. deep = 61

Therefore, EEC = $\frac{61\ ug/L}{ug/L} \times \frac{0.0005\ lb\ ai}{1\ lb\ ai}$ = 0.03

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