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SHAUGHNESSEY NO.

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PRODUCT MANAGER NO. G. LaRocca (15)

PRODUCT NAME(S) ASANA

COMPANY NAME DuPont

SUBMISSION PURPOSE Review proposal to add grain sorghum to Label

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	% A.I.
109303	S-fenvalerate	

100.0 Chemical: ASANA

100.1 Submission: DuPont is requesting registration of ASANA XL Insecticide 0.66 EC for use on grain sorghum.

100.2 Application Rate: A rate of 0.03-0.05 lb ai/A is proposed for sorghum with applications repeated as necessary but not to exceed 0.15 lb ai/A.

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.

100.5 Hazard Assessment: The proposed use of ASANA on sorghum entails about 12 million acres.

101.1 Likelihood of Adverse Effects to Nontarget Organisms

Although the acute/chronic fish and wildlife data base for ASANA is not complete, studies have shown that this isomer of fenvalerate appears to have similar fate and toxicity parameters as the parent compound. Therefore, the Agency will rely upon the fenvalerate data base in evaluating the potential hazard of ASANA use to nontarget terrestrial and aquatic organisms.

Aquatic Toxicity

Fenvalerate, a second generation pyrethroid, degrades in soil with a half-life of six months and undergoes hydrolysis after 24 days at ph 7.2. Fenvalerate can strongly bind to sediment/particulate and result 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 appears to interact with sodium gates (Lawrence and Casida 1983). Laboratory testing has shown that fenvalerate is very highly toxic to freshwater aquatic organisms as noted in acute toxicity values that ranged 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 for 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 in metabolic-salinity patterns of larval grass shrimp Palemonetes pugio. This alteration reduces ecological fitness at a critical life stage by limiting the capacity of the organism to adapt to fluctuating salinity conditions that are normally encountered in estuarine waters.

Since the exposure potential of a pesticide is a critical component in developing a risk assessment, it appears that this proposed large acreage use of ASANA on sorghum may result in an incremental risk to nontarget organisms. In order to evaluate this potential risk, the Ecological Effects Branch (EEB) has calculated expected environmental concentrations (EEC) of ASANA residues by using a model that assumes a 5% drift and 0.1% pesticide runoff into a one acre pond from an adjacent 10 acre drainage basin (Appendix I). These calculations suggest that at the maximum rate of 0.05 lb ai/A the use of ASANA may result in runoff residues (0.03 and 0.154 ug/L) to an aquatic system that exceeds aquatic toxicity concerns, especially to aquatic invertebrates. Smith et al. (1983) noted that fenvalerate concentration in runoff from a sugarcane-insect IPM system could present a toxicity problem to aquatic organisms. They concluded that although the toxicity of fenvalerate may be reduced as a result of sorption to sediment, this reduction was only 2-fold, and does not eliminate aquatic hazard.

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	Residues (ppm)
Short Grass	14.0
Dense Foliage/ 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 should not present a direct toxicity threat to birds, since, the expected residues are 6 to 3 orders of magnitude less than the avian toxicity values. However, because of the toxicity of ASANA to aquatic invertebrates, runoff of this pesticide may affect a significant trophic level that waterfowl are dependent upon, especially during breeding.

101.3 Endangered Species

The following EEC's and Endangered Species Triggers were calculated for ASANA.

Organisms	Toxicity values	Trigger	Max. EEC
Avian	$LC-_{50}$=10,000 ppm	1/10 LC_{50}= 1000 ppm	14 ppm
Fish	$LC-_{50}$=0.31 ug/L	1/20 LC_{50}= 0.015 ug/L	0.154 ug/L
Invert.	$LC-_{50}$=0.032 ug/L	1/20 LC_{50}= 0.0016 ug/L	0.154 ug/L

The above EEC calculations suggest that ASANA exposure to endangered fish, aquatic invertebrates and terrestrial invertebrates exceeds the endangered species trigger of 1/20 LC_{50} values. However, a full assessment of risk to endangered species can not be concluded at this time because pertinent ecological effects data (mesocosm) have not been submitted.

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107.0 Conclusions

EEB has partially completed an evaluation of the proposed ASANA Section 3 registration for sorghum. Expected environmental residues were calculated in order to assess the potential hazard of ASANA exposure to avian and aquatic organisms. These calculated residues appear to exceed acute/chronic toxicity values for fish and aquatic invertebrates by one to three orders of magnitude and suggest the potential for risk to aquatic organisms. The calculated residue levels for assessing ASANA exposure and toxicity to avians suggest that the proposed use patterns should not directly affect birds, but could result in a possible indirect effect to certain waterfowl by altering a significant aquatic invertebrate food base. However, at this time EEB can not complete a risk assessment of this chemical because relevant ecological effects data (mesocosm) have not been submitted for review. Until this assessment is completed, any expansion of the ASANA registration could possibly result in an increase risk the wildlife and aquatic organisms.

Miachel Rexrode 5/30/90

Miachel Rexrode, Fishery Biologist
Ecological Effects Branch
Environmental Fate and Effects Division

Ann Stavola 5/31/90

Ann Stavola, Section Head
Ecological Effects Branch
Environmental Fate and Effects Division

James Akerman 6/5/90

James Akerman, Chief
Ecological Effects Branch
Environmental Fate and Effects Division

Appendix I - EEC Calculations for ASANA Use on Sorghum

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

II. Aerial Application

Assumptions

0.1% runoff
60% application efficiency
10 acre drainage basin
5% drift
0.05 lb ai/A of ASANA

(A) Runoff

0.05 lb ai/A x 0.6 x 0.001 x 10 A = 0.00003 lb ai found in total runoff

(B) Drift

0.05 ai/A x 0.05 = 0.0025 lbs ai in total drift

Therefore, EEC = $\frac{61 \text{ ug/L}}{1 \text{ lb ai}} \times \frac{0.0025 \text{ lb ai}}{1}$ = 0.154 ug/L

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