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109303
SHAUGHNESSEY NO

18
REVIEW NO.

EEB REVIEW

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DATA ACCESSION NO(S)

PRODUCT MANAGER, NO. 41

PRODUCT NAME(S) ASANA XL

COMPANY NAME ND- Dept of Agriculture

SUBMISSION PURPOSE Sec 18 -to control grasshoppers in small grains and CRP-ND

SHAUGHNESSEY NO.	CHEMICAL	% A.I.
109303	ES-Fenvalerate	

100.1 Submission Purpose

The State of North Dakota is requesting an emergency exemption (Section 18) for the use of esfenvalerate (ASANA) to control grasshoppers in small grains.

100.2 Application Rate/Methods/Directions

Application is to include 0.015 - 0.03 lb ai/A for two applications. A maximum of 8 million acres are expected to be treated by aerial and ground application methods.

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 North Dakota is requesting an emergency exemption for the use of ASANA, the 2S - XS isomer of esfenvalerates on small grains to control grasshoppers. This proposed Section 18 calls for the maximum application of 0.03 lb ai/A, twice per season, on 8 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

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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 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 reduces the ecological fitness at a critical life stage by limiting the organisms capacity to adapt to fluctuating salinity conditions that are normally encountered in estuarine waters.

An assessment of the potential environmental risk of a pesticide must include actual or estimated values of exposure. Smith et al. (1983) noted that fenvalerate concentrations in runoff from a sugarcane-insect IPM system could present a toxicity problem to aquatic organisms. Although the toxicity of fenvalerate may be reduced as a result of sorption to sediment, Coulon (1982) found that this reduction was only 2-fold, and does not eliminate aquatic hazard.

The Ecological Effects Branch (EEB) has calculated estimated environmental concentrations (EEC) of ASANA residues on small grains following ground and aerial application (Appendix I). These calculations suggest that at 0.03 lb ai/A, the expected concentration of ASANA from both types of application are 0.02 and 0.09 ug/L, respectively. A comparison of these estimates with acute and chronic toxicity values suggests that ASANA use on small grains may result in environmental residues that exceed aquatic toxicity concerns through runoff and drift 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} = 9932 ppm; Bobwhite quail 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 avian 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 0.03 lb ai/A on Small Grains

Food Type	Residue (ppm)
Short grass	7.5
Dense Foliage/Small Insects	1.7
Large Insects	0.4

The maximum expected residues from the consumption of vegetation and insects (application rate of 0.03 lb ai/A) are expected to range from 0.04 to 7.5 ppm. These values show that ASANA use on small grains should not present a direct toxicity threat to birds (expected residues are 6 to 3 orders of magnitudes less than acute and chronic toxicity values). However, the high toxicity of ASANA to aquatic invertebrates and the possibility of exposure to aquatic environments from runoff and drift can result in an indirect effect to waterfowl recruitment by impacting a significant food base.

The small grain growing area of North Dakota consists of the prairie pothole region, (which accounts for a significant annual duck population (Smith et al. 1964). These pothole wetlands can range in size from one to over ten acres in area and can retain water throughout the summer. Several species of waterfowl nest and feed in these pothole regions. Dabbling ducks, mallards, pintails, blue winged teals and shovelers are found in and around potholes throughout North and South Dakota from mid-April to mid-July. Nesting birds are sensitive to nutrient needs at this time and rely upon aquatic invertebrates from the pothole area as a chief source of protein and calcium (Swanson et al. 1979). The environmental persistence of ASANA and its high toxicity to fish and aquatic invertebrates suggests that unrestricted use of this pesticide on North Dakota wheat fields could impact a significant waterfowl food base and affect waterfowl recruitment that could lead to a population reduction.

101.2 Endangered Species

Based upon the information found in the EEB Endangered Species File, it appears that this use of ASANA may indirectly impact the Least Tern (Sterna antillarum) and the Piping Plover (Charadrium melodus). Although ASANA is not acutely toxic to birds, it is highly toxic to aquatic organisms, such as invertebrates and fish. The alteration or disruption of a significant tropic level could affect these endangered birds, especially since ASANA is to be applied during the breeding season (March - June). The EEB has identified the following counties where these birds are found:

Benson	Foster	Morton	Sioux
Bottineau	Grand Forks	Mountrail	Stutsman
Burke	Kidder	Nelson	Towner
Burleigh	Logan	Oliver	Ward
Cass	McHenry	Pierce	Wells
Divide	McIntosh	Ramsey	Williams
Dunn	McKenzie	Renville	
Eddy	McLean	Rolette	
Emmons	Mercer	Sheridan	

Any spraying near prairie potholes, lakes or rivers may be detrimental to these endangered species. The EEB strongly recommends against aerial application of this pesticide near any aquatic habitat. The unpredictability of wind conditions during aerial application can result in significant drift and can not be mitigated by buffer zones. If this Section 18 is approved, the North Dakota Department of Agriculture must contact Wayne Wathen at the Fish and Wildlife Regional Office (FTS 776-7698) for clarification as to the presence of any endangered species near fields that are to be sprayed.

107.0 Conclusions

EEB has completed its evaluation of this Section 18 request for the use of ASANA on small grains in North Dakota. Expected environmental residues were calculated in order to assess the potential hazards of ASANA to avian and aquatic species. The expected residues from field runoff and drift exceed acute/chronic toxicity values by one to two orders of magnitude. Although this use use of ASANA should not be directly toxic to birds, there is a possibility of indirect effects from impacting an invertebrate food base that waterfowl are dependent upon. EEB strongly recommends against any aerial applications near aquatic habitats. The unpredictability of wind conditions during aerial application can result in significant drift that may impact aquatic

invertebrates and indirectly effect waterfowl.

Endangered species concerns have been noted with a listing of counties of concern. Two avian species, the Piping Plover and the Least Tern, may be affected indirectly by a reduction in food base (aquatic invertebrates, small fish) from ASANA exposure, especially during breeding season. If this Section 18 is approved, the North Dakota Department of Agriculture must contact the U.S. Fish and Wildlife regional office (FTS 776-7698) for clarification as to the presence of endangered species prior to any spraying.

Miachel Rexrode 3/31/90

Miachel Rexrode, Fisheries Biologist
Ecological Effects Branch
Environmental Fate & Effects Division (H7507C)

for 4/10/90

Doug Urban, Section Head
Ecological Effects Branch
Environmental Fate & Effects Division (H7507C)

4/19/90

James W. Akerman, Chief
Ecological Effects Branch
Environmental Fate Effects Division (H7507C)

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Appendix I: EEC Calculations for ASANA Use on Small Grains

1) Ground Application

Assumptions

0.1% runoff

10 acre drainage basin

0.03 lb ai/A

Runoff

0.03 lb ai/A x 0.001 x 1 A = 0.0003 lb ai total runoff

EEC of 1 lb ai, direct application to 1 A pond

6 ft deep = 61 ug/L

Therefore: $EEC = \frac{61 \text{ ug/L}}{1 \text{ lb ai}} \times \frac{0.0003 \text{ lb ai}}{1} = 0.02 \text{ ug/L}$

II. Aerial Application

Assumptions:

0.1% runoff

60% application efficiency

10 acre drainage basin

5% drift

0.03 lb ai/A

Runoff

0.03 lb ai/A x 0.6 x 0.0001 x 10 A = 0.00002 lb ai in runoff

Drift

0.03 lb ai/A x 0.05 = 0.0015 lb ai in drift

Therefore, $EEC = \frac{61 \text{ ug/L}}{1 \text{ lb ai}} \times \frac{0.0015 \text{ lb ai}}{1} = 0.09 \text{ ug/L}$

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Note to PM: Lately, several Section 18 requests for the use of ASANA have entailed millions of acres. EEB is concerned about this increase potential for exposure to nontarget organism and feels that a more thorough risk assessment is not possible until the required mesocosm data is reviewed and a Section 3 registration evaluated.