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TYPE PRODUCT(S) : (I,) D, H, F, N, R, S

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. 41

PRODUCT NAME(S) ASANA XL

COMPANY NAME Department of Agriculture of Minnesota

SUBMISSION PURPOSE Sec. 18 - Minnesota Sec. 18 to control grasshoppers on small grain conservation reserve and Dept. of Nat. Reserve Wildlife areas

SHAUGHNESSEY NO.	CHEMICAL	% A.I.
109303	Esfenvalerate	

100.1 Submission Purpose

The Minnesota Department of Agriculture is requesting an emergency exemption (Section 18) for the use of esfenvalerate (ASANA) to control grasshopper species on small grains, conservation reserve and wildlife areas.

100.2 Application Rate/Methods/Direction

ASANA is to be applied at 0.015 to 0.03 lb ai/A either by air or ground, once per season, to a total of 4 million acres.

100.3 Target Organism

Grasshopper (Melanaplus spp.)

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 state of Minnesota is requesting an emergency exemption for the use of ASANA XL on small grains. This proposed Section 18 calls for an application of 0.015 - 0.03 lb ai/A, once per season on four million acres to control grasshoppers.

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 hydrelysis 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 for Daphnia magna to 2.35 ug/L for 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 an alteration 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 concentration 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 sediments, 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 (highest application level) the expected concentration of ASANA from both types of application are 0.03 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 (especially aquatic invertebrates) through runoff and drift from fields adjacent to aquatic systems.

Avian Toxicity

The available data suggest 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 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	0.04

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 magnitude 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 areas of Minnesota consists of the prairie pothole region, which account 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 form 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 suggest that unrestricted use of this pesticide on South Dakota grain 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).

Any spraying near prairie potholes, lakes, or rivers may be detrimental to these endangered species. Although the Minnesota Department of Agriculture notes that "no applications will be allowed within 250 yards of open or protected waters," this can not assure against potential drift from adjacent fields after aerial application. The EEB strongly recommends against aerial application of this pesticide near any aquatic habitat, especially in the prairie pothole region. The unpredictability of wind conditions during aerial application can result in significant drift inspite of buffer zones. If this Section 18 is approved, the Minnesota Department of Agriculture must contact the U.S. Fish and Wildlife Service (Sharon Vassar FTS:725-3276) for clarification as to the presence of 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 grain in Minnesota. 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 and drift exceed acute/chronic toxicity values for fish and aquatic invertebrates by one to three orders of magnitude. Although this 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. The use of buffer zones for ground application may mitigate exposure to nontarget organisms. However, 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 were addressed in Section 101.2. 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 Minnesota Department of Agriculture must contact the U.S. Fish and Wildlife Service (Sharon Vassar FTS:725-3276) for clarification as to the presence of these endangered species near proposed spraying areas.

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

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

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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.