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PRODUCT MANAGER NO. ASANA XL

COMPANY NAME Kansas Dept. of Agriculture

SUBMISSION PURPOSE Section 18 to control western pale cutworm and army cutworm in small grains.

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
109303	ESFENVALERATE	

100.1 **Submission Purpose**

The Kansas Department of Agriculture is requesting an emergency exemption (Section 18) for the use of esfenvalerate to control army cutworms and pale western cutworms on small grains.

100.2 **Application Rate/Methods/Directions**

Application by ground or aerial equipment is requested at a rate of 0.03 to 0.05 lb ai/A to cover a maximum of 470,400 acres, treating all counties, with one application per season.

100.3 **Target Organisms**

Pale Western Cutworm (*Agrotis orthogonia*)
Army Cutworm (*Euxoa auxiliaries*)

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 Kanasas is requesting an emergency exemption for the use of ASANA on small grains. This proposed Section 18 calls for an application of 0.03 - 0.05 lb ai/A to control cutworms. Application will be once per season to include a maximum of 470,400 acres. All counties will be sprayed.

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, Palaemonetes pugio. This reduces ecological fitness at this 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 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 winter wheat following ground and aerial application (Appendix I). These calculations suggest that at 0.05 lb ai/A (highest application level) the expected concentration of ASANA from both types of application are 0.03 and 0.154 ug/L, respectively. A comparison of these estimates with acute and chronic toxicity values suggests that ASANA use on winter wheat may result in environmental residues that exceed aquatic toxicity concerns, especially to aquatic invertebrates, 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,[illegible] 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 on Small Grains

Food Type	Residue (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 on small grains 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 of ASANA exposure to aquatic invertebrates that serve as a food base for waterfowl. Since, ASANA is very toxic to aquatic organisms, drift or runoff from sprayed fields could effect a significant trophic level that certain waterfowl are dependent upon, especially in the spring during breeding.

101.2 Endangered Species

Based upon the information found in the EEB Endangered species file, the Neosho Madtom is an endangered fish found in the following counties that may be sprayed: Allen, Chase, Cherokee, Coffey, Labette, Lyon, Neosho and Woodson.

Direct toxicity of ASANA to endangered birds does not appear to be a concern, however, an indirect effect via the disruption of a significant trophic level may effect the Least Tern (Sterna antillarum) and the Piping Plover (Charadrium melodus). These birds are found in the following counties: Barton, Clark, Comanche, Meade, Phillips, Rice and Stafford.Since, these birds nest and feed in aquatic areas, any impact on small fish and aquatic invertebrates may result in a reduction in natural food which could unnecessarily stress these birds and affect populations, especially during the spring breeding season.

The Kansas Department of Agriculture intends to apply this pesticide within one mile of moving fish bearing waters or no closer than 100 feet to non-moving fish bearing waters. The use of buffer zones from aquatic habitat are intended to protect this environment and mitigate any pesticidal impact to nontarget organisms. The EEB concurs with this action for ground but not for aerial applications. The unpredictability of wind conditions during aerial application can result in significant drift inspite of prescribed buffer zones. If this Section 18 is approved, the Kansas Department of Agriculture must contact the U.S. Fish and Wildlife regional office (Wayne Wathen, FTS: 776-7698) prior to any spraying in order to document the presence of endangered species in the area of concern.

107.0 Conclusions

EEB has completed its evaluation of this Section 18 request for the use of ASANA on small grains in Kansas. Expected environmental residues were calculated in order to assess the potential hazard of ASANA to avian and aquatic species. The residues from field runoff and drift exceed the acute/chronic toxicity values for fish and aquatic invertebrates by one to three orders of magnitude and may effectively impact these organisms. Although ASANA use should not be directly toxic to birds, there is a possibility of an indirect effect from the alteration of an invertebrate food base that waterfowl are dependent upon. The Kansas Department of Agriculture has suggested that buffer zones be used around aquatic habitats in order to mitigate any potential exposure to nontarget organisms. The EEB agrees to this use of buffer zones for ground but not for aerial applications. 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. Endangered aquatic species that could be impacted include the Neosho Madtom. Although, ASANA residues should not be acutely toxic to birds, two avian species, the Piping Plover and the Least Tern, may be affected indirectly by an alteration in their food base (aquatic invertebrates, small fish), especially during breeding season. If this Section 18 is approved, the Kansas Department of Agriculture must contact the U.S. Fish and Wildlife regional office (Wayne Wathen FTS 776-7698) for clarification as to the presence of endangered species in a target area prior to any applications.

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Appendix I - EEC Calculations for ASANA Use on Winter Wheat

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 = $\frac{61\ ug/L}{1\ lb\ ai}$ x 0.0005 lb ai = 0.03ug/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 06 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 = $\frac{61\ ug/L}{1\ lb\ ai}$ x $\frac{0.0025}{1}$ lb ai = o.154 ug/L

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