242888
RECORD NO.

109303
SHAUGHNESSEY NO.

11
REVIEW NO.

EEB REVIEW

DATE: IN 4-12-89 OUT MAY 16 1989

FILE OR REG. NO 78-SD-03

PETITION OR EXP. NO.

DATE OF SUBMISSION 3-17-89

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RD ACTION CODE/TYPE OF REVIEW 510

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

DATA ACCESSION NO(S):

PRODUCT MANAGER NO. D. Stubbs (41)

PRODUCT NAME(S) ASANA XL(0.66 EC)

COMPANY NAME State of South Dakota

SUBMISSION PURPOSE proposed § 18 for use on winter wheat

SHAUGHNESSEY NO.	CHEMICAL & FORMULATION	A.I.
109303	Es fenvalerate	24%

100.1 Submission Purpose

The State of South Dakota is requesting an emergency (Section 18) for the use of ASANA XL Insecticide to control army cutworms and pale western cutworms on winter wheat.

100.2 Application Rate/Methods/Directions

Application by ground or aerial equipment is requested at a rate of 0.03 - 0.05 lb ai/A. A maximum of 100,000 acres are to be treated (all South Dakota counties) from March 27, 1989 to June 30, 1989. Rate of application will be once with a total of 5,000 lbs ai for the entire State.

100.3 Target Organism

Pale western cutworm, Agrotis orthogenia, and the army cutworm, Euxoa auxiliaries outbreaks are influenced by climatic and environmental conditions which coincide with dry weather. If the weather during the Fall, Winter and Spring is dry, there is a strong possibility of cutworm population increase in this area.

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 Formulation Information

ASANA 19 EC, EPA Registration No. 352-502

Active Ingredient:

(S)-cyano (3-phenoxyphenyl) methyl-
(S)-4-chloro-alpha-(1-methylethyl)
benzeneacetate..... 24%
Inert Ingredients..... 76%
This product contains 1.9 lbs. of ANANA per gallon.

101.0 Hazard Assessment

The South Dakota Department of Agriculture is requesting an emergency exemption for the use of ASANA, the 25-XS isomer of esfenvalerate, on winter wheat to control cutworms. Esfenvalerate (Pydrin) is currently registered

for use on a number of crops such as field corn, melons, peppers, potatoes, tomatoes, fruit and nut orchards, squash, cucumber, eggplant, beans, sweet corn, cotton, soybeans and peanuts. This proposed Section 18 use of ASANA calls for the application of 0.05 lb ai/A, once per season, on 100,000 acres.

101.1 Likelihood of Adverse Effects to Nontaraget Organisms

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

Aquatic Toxicity

Pydrin, a second generation pyrethroid, degrades degrades in soil with a half-life of 6 degrades in soil with a half-life of 6 months and undergoes hydrolysis after 24 days at ph 7.2. Pydrin strongly binds to sediment and particulate resulting in a soil/water partition coefficient greater than 15,000.

Pydrin is a neurotoxicant and effector of ion permeability (Miller and Adams, 1982) and appears to interact with sodium gates (Lawrence and Casido, 1983). Laboratory studies have shown that pydrin is very highly toxic to fish and aquatic organisms. Shimmel et al. (1983) found that pydrin 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 acute toxicity values for estuarine fish ranging from 5.0 (0.66 - 5.3) ug/L for sheepshead minnow, Cyprinodon variegatus, to 0.31 (0.21 - 0.40) ug/L for Atlantic silversides, Menidia menidia.

An evaluation of sublethal pydrin exposure to aquatic invertebrate larval development and metabolism was conducted by McKenney and Hamaker (1984). They concluded that there were alterations in metabolic-salinity patterns of larval grass shrimp, Palaemonetes pugio, exposed to 0.0001 and 0.0002 ug/L pydrin. These low levels of pydrin appeared to reduce the 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.

Jarvinen et al. (1988) evluated pydrin toxicity to fathead minnows, Pimephales promelas, following episodic and continuous exposure to the pesticide. Their results

showed that a 48-hour exposure to pydrin at a concentration similar to a continuous exposure 96-hour LC_{50} can cause adverse growth effects (50% deformities) within 30 days.

An assessment of the potential environmental risk of a pesticide must include actual or estimated values of exposure. At present, DuPont Agricultural Products is conducting an aquatic mesocosm experiment in order to evaluate the ecological effects of pydrin/ASANA on non-target aquatic organisms. Since, this study has not been completed, EEB has calculated estimated environmental concentrations (EEC) of ASANA residues on wheat fields following ground and aerial application (Appendix I). These calculations suggest that at 0.05 lb ai/A, 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 suggest that ASANA use on winter wheat may result in environmental residues that exceed aquatic toxicity concerns by one to three orders of magnitude. Until the mesocosm data are evaluated, it appears that this ASANA use could adversely effect aquatic organisms through runoff and drift from adjacent fields.

Avian Toxicity

The available data suggests that pydrin 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 Pydrin Residues on Avian Food and Dietary Intake (ppm)

Food Type	Residue (ppm)
Short Grass	14
Dense Foilage/ Small Insects	2.8
Large Insects	0.06

The maximum expected residues from the consumption of vegetation and insects (application rate of 0.05 lb ai/A) are expected to range from 0.06 to 14 ppm. These values show that ASANA use on wheat 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.

The wheat-growing area of South 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 suggest that unrestricted use of this pesticide on South 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:

Bon Homme	Dewey	Sulley
Charles Mix	Haakon	Union
Clay	Hughes	Walworth
Day	Stanley	Yankton
		Ziebach

Any spraying near prairie potholes, lakes, or rivers may be detrimental to these endangered species. Before any ASANA is applied in the counties of concern, the South Dakota Department of Agriculture should contact Mr. Zschonlen at the U.S. Fish and Wildlife office at (605) 224-8693 for clarification as to the presence of these endangered birds near fields that are to be sprayed.

5

107.0 Conclusions

EEB has completed its evaluation of this Section 18 request for the use of ASANA on winter wheat in South Dakota. Expected environmental residues were calculated in order to assess the potential hazard of ASANA to avian and aquatic species. Although this use of ASANA should not be directly toxic to birds, there is a possibility of indirect effects to the invertebrate food base used by waterfowl found in prairie pothole areas. 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. Therefore use of ASANA at 0.05 lb ai/A on wheat fields could result in an increased risk to aquatic organisms and waterfowl in lakes and streams adjacent to these fields.

Endangered species concerns were addressed in Section 101.2. Before ASANA is used in the designted counties of concern, the South Dakota Department of Agriculture should contact Mr. Zschomlen at the U.S. Fish and Wildlife office (605) 224-8693 for clarification as to the distribution of the least tern and the piping plover.

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

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

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