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SHAUGHNESSEY NO

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EEB REVIEW

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DATA ACCESSION NO(S) _____

PRODUCT MANAGER, NO. D. Stubbs (41)

PRODUCT NAME(S) Agri-Mek 0.15 EC

COMPANY NAME State of Arizona

SUBMISSION PURPOSE Proposed Section 18 for use on head lettuce

SHAUGHNESSEY NO. _____ CHEMICAL _____ % A.I. _____

_____ Avermectin _____

_____ _____

ECOLOGICAL EFFECTS BRANCH REVIEW
SECTION 18

AVERMECTIN

100 Section 18 Application

100.1 Nature and Scope of Emergency

The state of Arizona requests a specific exemption to use Avermectin on Head Lettuce in the counties of Yuma, La Paz, Maricopa, Pinal, and Pima. The American serpentine leafminer is a newly arrived pest in the area and is thought to be resistant to other pesticides. Avermectin, Agri-mek is expected to be effective against this pest.

100.2 Target Organism

The American Serpentine Leafminer

100.3 Date, Duration

Sept. 1, 1989 - June 15, 1990

100.4 Application Methods, Direction, Rates

Use rates would be 0.01 to 0.02 lb ai/acre (8-16 fl oz formulated product/acre). Repeat applications could be made at 7-day intervals not to exceed 0.16 lbs ai to any given lettuce crop.

100.5 Treatment Area

Lettuce acreage in Arizona for 1989 was 53,000 acres and is expected to increase to 54,000 in 1990. Five counties will be effected; La Paz, Maricopa, Pima, Pinal, and Yuma.

100.6 Precautionary Labeling

The following statement will occur on the label:

This pesticide is toxic to fish and wildlife. Keep out of lakes, ponds or streams. Do not contaminate water when disposing of equipment washwaters.

Do not apply when weather conditions favor drift from target areas.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

101 Hazard Assessment101.1 Discussion

Avermectin would be applied at 0.01-0.02 lb ai/acre. On any one lettuce crop the amount of product applied would not exceed 0.16 lb ai/acre (128 fl oz f.p.). Applications would be at seven day intervals.

101.2 Likelihood of Adverse Effects on Nontarget Organisms

A summary of the known toxicity and Environmental Fate information can be found in previous a review by D. Rieder on 4/11/89.

Terrestrial Exposure

The following theoretical values were calculated based on historical measured residue data used to generate a nomograph presented in Hoerger and Kenaga (1972). If avermectin is applied at 0.02 lb ai/acre, the following residues (ppm) occur on terrestrial food items immediately after treatment.

	<u>Short</u> <u>Grass</u>	<u>Long</u> <u>Grass</u>	<u>Leafy</u> <u>Crops</u>	<u>Insects</u> <u>Forage</u>	<u>Seed</u> <u>Pods</u>	<u>Fruit</u>
maximum	4.8	2.2	2.5	1.16	0.24	0.14
typical	2.5	1.8	0.7	0.66	0.06	0.03

Birds

These residues do not exceed the lowest avian dietary LC50 of 383 ppm nor the avian reproductive NOEL of 12 ppm. Therefore, no acute or chronic hazard to birds is expected.

Mammals

Using an acute oral LD50 of 10 mg/kg for adult rats the following 1-day adult LC50 values (ppm) were calculated* for selected mammals. The weanling 1 day LC50 values were based on a 1.5 mg/kg LD50 for weanling rats. The third column in the table is the extrapolated reproductive NOEL's (ppm) based on the rat 1-generation reproductive test*. The weight and food consumption data are from Davis and Golly (1963).

* LC50 (ppm) = LD50 x wt. (g) / consumption in 1 day (g)

* repro. NOEL = rat NOEL x wt (g) / consumption in 1 day (g)

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	1 day LC50 (ppm) adult	weanling	Repro. NOEL
<u>Grazing Herbivore</u>			
meadow vole	16	2.5	0.16
swamp rabbit	24	3.6	0.24
deer	412	61.4	4.12
<u>Granivores</u>			
red squirrel	142	21.3	1.4
<u>Omnivores</u>			
deer mouse	51	7.7	0.5
raccoon	470	70.8	4.7
<u>Insectivores</u>			
least shrew	9	1.4	0.09
<u>Carnivores</u>			
least weasel	40	6	0.4

The extrapolated adult LC50's are not exceeded by the estimated residues on terrestrial food items. Estimated "typical" residues on short grass equal the LC50 for weanling meadow voles. Therefore, acute effects may occur to certain young mammals. Based on the extrapolated reproductive NOEL's, it is likely that when ingesting food items containing typical residues, grazing herbivores, omnivores, and insectivores of small size would receive greater than their reproductive NOEL. Granivores and carnivores would not likely ingest food with residues greater than their reproductive NOEL. Based on this, it is likely that with the use of Avermectin at 0.02 lb ai/acre, acute effects may occur to young grazers and chronic effects may occur to certain grazing herbivores, omnivores and insectivores. Even though Avermectin is relatively short-lived in light, it is likely that small mammals will experience adverse effects.

Aquatic

Because of its low solubility (7.8 ppb) and high octanol water partition coefficient (9,900), minimal transport of Avermectin by runoff (i.e. 1.0% 0.01) is expected. Based on a scenerio of 10 treated acres draining into a 1 acre pond 6 feet deep, the following concentration is derived.

$$10 \text{ acres} \times 0.02 \text{ lb ai/A} \times 0.01 \times 61 \text{ ppb} = 0.122 \text{ ppb}$$

This is less than the LC50 for shrimp, oysters, and Daphnia magna. It exceeds the Daphnia magna chronic NOEL of 0.03 ppb and exceeds the Mysid shrimp MATC of 0.0035 ppb.

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It does not exceed the lowest fish LC50 nor 0.1 of the fish early life stage NOEL; rainbow trout LC50=3.2 ppb, rainbow trout early life stage NOEL=0.52 ppb.

Since this is a ground application, drift is expected to be minimal and would not result in hazardous concentrations for non endangered aquatic species.

Summary

Based on the above assessment, nonendangered aquatic or estuarine organisms will experience minimal acute effects. Fish may experience minimal chronic effects however estuarine and aquatic invertebrates are likely to experience adverse chronic effects. Nonendangered birds may experience minimal acute and chronic effects. Large mammals would not experience adverse acute effects, nor would granivores or carnivores experience reproductive effects. However weanling rodents (meadow voles) may experience acute effects, and grazing herbivores, omnivores, and insectivores of small size would receive greater than their reproductive NOEL. This use of Avermectin represents a hazard to these mammals and possibly certain exposed reptiles and terrestrial amphibians. Terrestrial field testing would be required before EEB could conclude safety from such exposure.

101.3 Endangered Species Considerations

The endangered species triggers are:

GROUP	TRIGGER	
	REPRO. NOEL	ACUTE
Birds	12 ppm	38.3 ppm (LC50/10)
Mammals, Terrestrial Amph., Reptiles	0.09 ppm	0.14 ppm (LC50/20)
Fish	0.52 ppb	0.16 ppb (LC50/20)
Aquatic Inverts	0.03 ppb	0.011 ppb (LC50/20)

Maximum residues do not exceed the avian endangered species triggers. Adverse effects to birds are not expected.

There are no terrestrial amphibians or reptile endangered species in the area of concern.

Maximum residues do exceed both the mammalian acute and chronic triggers. Adverse effects would be expected to occur to endangered mammal species exposed to Avermectin. This would include grazing herbivores, omnivores, insectivores, and granivores. It is not likely to include carnivores, since Avermectin does not have a high bioaccumulation factor (69x: whole fish, 30x: fillet, 110x: viscera).

The following endangered mammal species are found in Arizona:

COUNTY	SPECIES	IMPACT LIKELY?
Pima, Yuma	Pronghorn, Sonoran	The potential is there for pronghorn to be feeding in areas where abamectin is used. However, taking into consideration body weight of the animal and food consumption per day, maximum residues do not exceed large mammal acute or chronic triggers.
Maricopa, Pinal, Pima	Gila Topminnow	Exposure likely only adjacent to the Colorado River, 100 yard buffer zone advised.

There are no endangered aquatic invertebrates in the areas of proposed use. However, the Gila Topminnow, an endangered fish species, are in areas of the Colorado River. A 100 yard buffer zone is advised adjacent to the Colorado River.

Summary

Based on available information, use of Avermectin in La Paz, Maricopa, Pima, Pinal, and Yuma counties, Arizona, on head lettuce may have adverse effects on the Gila Topminnow. Therefore, a 100 yard buffer strip is advised adjacent to the Colorado River. Exposure to other endangered species in Arizona is unlikely.

101.4 Adequacy of Data

The available data were adequate to quantify the risks of this section 18.

101.5 Adequacy of Labeling

The labeling statement is adequate.

103 Conclusions

The EEB has reviewed the section 18 emergency exemption requested by Arizona. Based on the above assessment, Avermectin will have minimal acute effects on nonendangered birds, aquatic invertebrates and fish. It is likely to have adverse chronic effects on aquatic invertebrates. The use of Avermectin represents an acute and chronic hazard to small; herbivore, omnivore, and insectivore; mammals, reptiles, and terrestrial amphibians. Possible adverse effects to endangered species is limited to the Gila Topminnow and a 100 yard buffer strip is strongly recommended adjacent to the Colorado River.

References

- Davies, D.E. and Golly, F.B. 1963. Principles of Mammalogy. Reinhold Publ. Corp. N.Y.
- Hoerger, F.C. and Kenaga, E.E. 1972. Pesticide residues on plants correlation of representative data as a basis for estimation of their magnitude in the environment. Environmental Quality. Academic Press, New York, I:9-28.

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