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Shaughnessey No.

EEB REVIEW

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

DATA ACCESSION NO(S).

PRODUCT MANAGER NO. Cool/Stanton (41)

PRODUCT NAME(S) Various malathion products

COMPANY NAME USDA/APHIS

SUBMISSION PURPOSE Sec 18 - Emergency exemption for use in fruit fly eradication

SHAUGHNESSEY NO.	CHEMICAL AND FORMULATION	% A.I.
	Malathion	

ECOLOGICAL EFFECTS BRANCH REVIEW

100.1 SUBMISSION PURPOSE AND PESTICIDE USE

The United States Department of Agriculture / Animal and Plant Health Inspection Service (USDA/APHIS) has requested Section 18 Emergency Exemption permitting use of malathion for eradication of exotic fruit flies.

100.2 FORMULATION INFORMATION

This Section 18 request proposes to use any Federally registered product containing 91 to 95% active ingredient and any Federally registered 25% wettable powder formulation.

100.3 APPLICATION METHODS, DIRECTIONS, RATES (excerpted from submission request)

Malathion will be applied by air or ground equipment in quarantined areas where nonindigenous, subtropical fruit flies have been identified. Malathion is applied as a bait spray in urban areas and to host crops at 2.4 fluid ounces of active ingredient mixed with 9.6 fluid ounces of protien hydrolyzate per acre. Applications are at 5 to 21 day intervals. Bait sprays to host crops applied by ground equipment may be diluted with water.

A malathion treatment area is approximately 9 square miles around each fly find. Treatment areas enlarge as new finds are identified. Areas may also blend where many fly finds are identified so that a total treatment area is not necessary multiples of 9 square miles.

100.4 TARGET ORGANISMS

All exotic (non-established, quarantined) fruit flies.

101.0 HAZARD ASSESSMENT

The active ingredient will be applied at a rate of 2.4 fluid ounces per acre (0.15 lb a.i./acre). Following a single application, the maximum expected residues are expected to be:

Surface	Concentration
Short range grass	32 ppm
Long grass	14 ppm
Leaves and leafy crops	17 ppm
Forage, small insects	8 ppm
Pods containing seeds	1.4 ppm
Fruits	1.0 ppm
6" of water (direct application)	110 ppb
Aquatic EEC - aerial application	3.2 ppb
Aquatic EEC (EXAMS model,	0.36 ppb

C. Brassard, 1986)

101.1 TERRESTRIAL SPECIES

The available toxicity data show that, on an acute basis, malathion is moderately toxic to upland game birds (pheasant LD_{50} = 167 mg/kg) and slightly toxic to waterfowl (mallard LD_{50} = 1485 mg/kg). The active ingredient is slightly toxic to upland game birds (bobwhite LC_{50} = 3497 ppm) and practically non-toxic to waterfowl (mallard LC_{50} > 5000 ppm) when fed in the diet.

Based on the maximum residue level on short range grass (32 ppm), this proposal is not expected to adversely affect terrestrial vertebrates. This residue level is well below 1/10th the level of concern for the most sensitive species tested.

The acute LD_{50} for the honeybee is 0.27 ug/bee. Spray deposition studies conducted by the California State Water Resources board have shown that the California spray program (fruit fly eradication with 2.8 fluid ounces ai per acre) results in deposition levels significantly greater than the above LD_{50}. In addition, there is evidence in the entomological literature that honey bee populations may be adversely affected by the spraying of malathion.

101.2 AQUATIC SPECIES

Based on data in EEB's files, malathion is highly toxic to both warmwater and coldwater fish (rainbow trout LC_{50} = 4 ppb, bluegill sunfish LC_{50} = 20 ppb). Malathion is very highly toxic to the water flea (Daphnia magna) with a 48-hour EC_{50} of 1 ppb.

Malathion is highly toxic to estuarine fish and invertebrates. The hermit crab and grass shrimp have LC_{50} s of 100 ppb and 131 ppb, respectively. The sheepshead minnow LC_{50} is 40 ppb. Larval amphibians are also susceptible to malathion toxicity. The LC_{50} of the western chorus frog tadpole is 200 ppb.

Medfly control programs were conducted in Florida during FY85, 87 and 90. Multiple applications of malathion at weekly intervals were applied at the rate of 2.4 ounces of ULV per acre to control medfly infestations. Environmental monitoring for malathion residues was conducted during each of the control/eradication programs. Because of incomplete information on methods and materials as well as questionable statistical procedures used for analysis of data, EEB is unable to fully assess results of the monitoring program. However, residues as high as 51 ppm were reported and the shorter spray interval in this proposal is expected to increase aquatic residues. b

The California Department of Fish and Game conducted intensive monitoring of the 1981-82 California medfly eradication program. Direct application of malathion to inland streams resulted in mean

concentrations of 10.3 ppb. The highest measured concentration was 157 ppb. Interestingly, the empirical mean concentration was less than 25% of the theoretical mean based on water depth and application rate. Rainstorm runoff from aerially applied malathion sprayed one or two days previously resulted in concentrations of up to 1000 ppb in inland streams. The diversity of aquatic invertebrates was reduced but overall population density was not. At least seven fish kills were documented.

Residue levels observed in both Florida and California monitoring programs exceeded the special review trigger to fish and invertebrates.

The recent Massachusetts Encephalitis Aerial Spray Program resulted in fish kills (approximately 400,000 killifish) at four sites.If the Florida medfly eradication program results in accidental or deliberate application of malathion to natural bodies of water it is anticipated that fish kills will occur.

101.3 ENDANGERED SPECIES CONSIDERATION

Supplementary information submitted with the Section 18 request states that the current infestation is restricted to approximately 80 square miles in Dade County but that "this area may expand based on future fruit fly catches". A map shows that much of coastal Florida is at risk. On that basis, four endangered species might be threatened by this proposal. The species of concern and their distributions are listed below:

Okaloosa Darter - Okaloosa and Walton Counties
Schaus Swallowtail Butterfly - Dade and Monroe Counties
Stock Island Snail - Florida Keys
Apple Snail (sole food source of the Everglades Kite)
- several counties in south Florida

USDA/APHIS indicates that the U.S. Fish and Wildlife Service (FWS) and the Florida Fish and Game Commission were consulted "about the presence and protection of any endangered, threatened, and proposed species within or near the treatment area". FWS Special Agent Terry English (telephone number 305-536-4788) confirmed that there are no endangered species or critical habitats in the current treatment area. If an expanded treatment area becomes necessary, USDA/APHIS should again consult with FWS.

101.4 ADEQUACY OF THE TOXICITY DATA

The existing toxicity data base was sufficient to evaluate this proposal.

101.5 ADEQUACY OF LABELING

EEB is providing the following statements for use in supplementary

labeling:

"This pesticide is toxic to fish, aquatic invertebrates, and aquatic life stages of amphibians, Do not apply directly to water or to swamps, bogs, marshes, or potholes. Drift and runoff may be hazardous to aquatic organisms in areas near the application site. Do not contaminate water when disposing of equipment washwaters".

"This product is highly toxic to bees exposed to direct treatment of 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".

102 CONCLUSIONS

EEB has reviewed the proposed emergency exemption for the use of malathion to control exotic fruit flies in Florida. Malathion is registered for more than 100 sites as well as for control of adult mosquitoes and flies. Although the proposed rate of application is lower than registered rates for adult mosquito control and much lower than registered rates for use on numerous crops and noncrop sites, medfly eradication programs in California and encephalitis aerial spray programs in Massachusetts using slightly higher rates resulted in numerous fish kills (see above section on aquatic risk assessment).

It should be pointed out that the proposed residue monitoring program is inadequate to assess potential impact to nontarget species.

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