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Shaughnessey Code

REVIEW NUMBER

ECOLOGICAL EFFECTS BRANCH REVIEW

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PETITION OR EXP NO. _____

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RD ACTION CODE/TYPE OF REVIEW 510

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

DATA ACCESSION NO(S). _____

PRODUCT MANAGER NO. S. Stanton (41)

PRODUCT NAME(S) Bravo 720 (chlorothalonil)

COMPANY NAME Florida Dept. of Agriculture and Consumer Services

SUBMISSION PURPOSE Sec. 18 - control benomyl resistant anthracnose on mango.

SHAUGHNESSEY CODE _____ CHEMICAL AND FORMULATION _____ % A.I. _____

081901 Tetrachloroisophthalonitrile 54%

Ecological Effects Branch
Section 18
Emergency Exemption Request

CHLOROTHALONIL

100.0 Section 18 Application

100.1 Nature and Scope of Emergency

The Florida Department of Agriculture and Consumer Services requests and exemption to use Bravo 720 (chlorothalonil) fungicide on mangos to control anthracnose. This disease which is caused by the fungus Colletotrichum gloeosporioides has developed resistance to Benlate (benomyl) which is the only effective fungicide that can be applied to both flower and fruit. Other registered products are only labeled for "after fruit set".

100.2 Target Organism

Fungus Colletotrichum gloeosporioides

100.3 Date and Duration

Application begins during flowering (January to March), then is repeated at 7-14 day intervals until conditions no longer favor disease. Mangos are most susceptible to anthracnose during their early stage of development (February to April). Maturation period is from May through August.

100.4 Application Rate and Method

Bravo 720 is to be applied at the rate of 1.3 - 2.6 lbs ai/A. A maximum of 23 lbs/A/season may be used. Applications should be made with hydraulic air-assisted sprayers which are transported across the ground with tractors or other similar means.

100.5 Treatment Areas

It is anticipated that a maximum of 2,900 acres will be treated (1988 total production). Ninety percent of mangos are grown in Dade county. The remaining 10% are grown in

counties north of Dade to a line approximately even with the north edge of Lake Okeechobee. If the maximum use rate of 23 lbs/A is used over the entire production area, a total of 66,700 lbs of active ingredient will be used.

100.6 Precautionary Labeling

Environmental Hazard

This product is toxic to fish, aquatic invertebrates and marine/estuarine organisms. Runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water. Do not apply when weather conditions favor drift from treated areas. Apply only to areas specified on label.

101.0 Hazard Assessment

101.1 Likelihood of Adverse Effects to Non-Target Organisms

Toxicity

Chlorothalonil is practically non-toxic to mammals and birds on an acute basis. Its degradate, SD-3701, is slightly to moderately toxic.

<u>Species</u>	<u>Product</u>	<u>Test Type</u>	<u>Results</u>
Rat	technical	LD ₅₀	>10,000 mg/kg
Mallard	"	LD ₅₀	> 4,640 mg/kg
Mallard	"	LC ₅₀	21,500 ppm
B.W. Quail	"	LC ₅₀	>10,000 ppm
B.W. Quail	degradate	LC ₅₀	1,746 ppm
Mallard	"	LC ₅₀	2,000 ppm
Mallard	"	LD ₅₀	158 mg/kg

Avian reproduction studies using Chlorothalonil technical produced NOEL's = 10,000 ppm in mallards and = 1,000 ppm in bobwhite quail. The degradate showed reproductive effects at lower concentrations. The NOEL's for mallards and bobwhite quail are 50 ppm and 100 ppm, respectively.

Chlorothalonil is very highly toxic to freshwater fish and invertebrates, estuarine fish, and mollusks. It is highly toxic to shrimp. SD-3701 is slightly toxic to freshwater organisms.

<u>Species</u>	<u>Product</u>	<u>Test Type</u>	<u>Results</u>
R. Trout	technical	LC ₅₀	47 ppb
Bluegill	"	"	51 ppb
<u>D. Magna</u>	"	"	70 ppb
<u>D. Magna</u>	degradate	"	26 ppm
Bluegill	"	"	16 ppb
Sheepshead minnow	technical	"	32 ppb
Pink shrimp	"	"	165 ppb
<u>Crassostrea</u> <u>virginica</u>	"	EC ₅₀	3.6 ppb

Aquatic reproduction studies using chlorothalonil produced MATC values > 3 < 6.5 ppb and > 39 < 79 ppb for fathead minnows and D. magna, respectively.

Terrestrial Residues

The maximum residue level on tree leaves after one spraying with 2.6 lbs ai/A is 320 ppm. A total of nine applications of Bravo 720 at 2.6 lbs ai/A with 7 day intervals is equivalent to the maximum application rate of 23 lbs ai/A. Dissipation half-lives of 8 days for chlorothalonil and 6 days for DS-3701 were extrapolated from this residue information: Crops treated with 3.75 lbs. ai/A had residues of 3 ppm and 0.26 ppm for chlorothalonil and DS-3701, respectively after 59 days.

The previous information was used in a Fate computer program which calculates the daily accumulated pesticide residues resulting from multiple applications. Chlorothalonil's maximum and average accumulated residue concentrations on leaves are 700 ppm and 477 ppm, respectively. DS-3701's maximum and average accumulated residue concentrations on leaves are 577 ppm and 380 ppm, respectively.

Aquatic Residues

Although the application spray is directed into the tree canopy approximately 10% or .26 lbs ai/A can be expected to reach the ground. Nine applications can be made at 7 day intervals to equal the maximum application rate of 23 lbs ai/A. The soil degradation half-life is 30 days. Calculated from the Fate program, a daily average of .84 lbs ai/A can be expected to be on the ground during the 63 day application period.

Chlorothalonil's water solubility is 6 ppm therefore 1% of the active ingredient can be expected to run off. The EEC from runoff in a 1 acre pond with a depth of 6 feet after one application is calculated as follows:

$$\begin{array}{rcccl} .84 \text{ lb ai/A} & \times & .01 & \times & 61 \text{ ppb} & = & .514 \text{ ppb} \\ \text{residue} & & \text{runoff} & & \text{conversion} & & \\ & & & & \text{factor} & & \end{array}$$

The maximum EEC level resulting from runoff of repeat applications, is calculated from the Fate program which used an hydrolysis half-life of 30 days, an EEC of .514 ppb and 5 runoff occasions (1 every 14 days). The maximum residue level in the pond from runoff reached 1.5 ppb. The average EEC value found throughout the application period was .9 ppb.

The EEC level resulting from drift from mist blower application is calculated as follows:

$$\begin{array}{rcccl} 2.6 \text{ lbs ai} & \times & .05 & \times & 61 \text{ ppb} & = & 7.93 \text{ ppb} \\ & & (\% \text{ drift}) & & \text{conversion} & & \\ & & & & \text{factor} & & \end{array}$$

The maximum EEC level resulting from drift of repeat applications, is calculated from the Fate program which used an hydrolysis half-life of 30 days, an EEC of 7.9 ppb and 9 application at 7 day intervals. The maximum residue level in the pond from drift reached 40.6 ppb. The average EEC value found throughout the application period was 26.2 ppb.

A maximum aquatic EEC level of 27 ppb is calculated by the addition of the average EEC's from runoff and drift which are .9 ppb and 26.2 ppb, respectively.

Risk Assessment

Terrestrial

Both the maximum expected residue concentration of DS-3701 (577 ppm) and the average residue concentration (380 ppm) exceed the endangered species concern level (1/10 LC₅₀) for upland game (175 ppm) and waterfowl (200 ppm) species. DS-3701 also exceeds the ecological concern level for Restricted-Use Classification (1/5 LC₅₀) for upland game (350 ppm) species. Avian reproductive effects are likely to occur because the EEC exceeds the NOELs for mallards (50 ppm) and bobwhite quail (100 ppm).

The maximum expected residue concentration of chlorothalonil (700) does not exceed the avian ecological or endangered species concern levels. No reproductive effects are likely to occur.

Aquatic

Chlorothalonil's maximum aquatic EEC of 27 ppb exceeds the endangered species concern level ($1/20 LC_{50}$) for rainbow trout (2.3 ppb), bluegill (2.6 ppb) and D. magna (3.5 ppm). It also exceeds the ecological concern level for Unacceptable Risk ($EEC \geq 1/2 LC_{50}$) for rainbow trout (23.5 ppb), bluegill (25.5 ppb), sheepshead minnow (16 ppb) and mollusks (1.8 ppb).

Aquatic reproductive effects are likely to occur. The EEC exceeds the MATC values for fathead minnows.

Environmental Fate Information

Chlorothalonil does not photodegrade on leaf surfaces but degrades at a moderate rate in soils, with a half-life up to 30 days. It is slightly mobile to mobile in most soils. SD-3701 is persistent in soil, and there is no dissipation within 90 days.

Chlorothalonil is insoluble in water (.6 ppm) and is stable to hydrolysis for 30 days in water. Its half-life in sediment is 5 to 15 days.

Chlorothalonil and DS-3701 bioaccumulate in bluegill sunfish. Levels of chlorothalonil in tissues can reach 3000x the water concentration. DS-3701 can bioaccumulate up to 250x. The average concentration of chlorothalonil in the pond scenario throughout the application period of 70 days is 27 ppb. Even if chlorothalonil bioaccumulated less than the previously stated maximum level, it could cause secondary poisoning to piscivorous fish and avian species.

102.0 Endangered Species Considerations

The terrestrial ECC of DS-3701, chlorothalonil's major degradate, exceeds the endangered species concern level. Chlorothalonil's aquatic EEC exceeds the endangered species concern level. There are no Federally Listed Endangered Species of Florida that are likely to be adversely affected by the emergency application of Bravo 720 on mangos at the previously discussed rate. There are no endangered species in the counties of application which utilize an orchard habitat or small pond.

103.0 Adequacy of Toxicity Data

The available data were adequate to assess the potential hazard of this proposed Section 18.

104.0 Adequacy of Labelling

Revised labeling should read as follows:

Environmental Hazards

This product is toxic to fish, aquatic invertebrates, and marine/estuarine organisms. Do not contaminate water when disposing of equipment washwaters. Do not apply directly to water, swamps, wetlands, bogs, marshes and potholes.

105.0 Conclusion

Chlorothalonil is very highly toxic to freshwater fish, aquatic invertebrates, and estuarine/marine organisms. As a result of multiple applications adverse effects to aquatic organisms may occur. Chlorothalonil may bioaccumulate to toxic levels and may cause secondary toxicity. Multiple applications also result in the accumulation of DS-3701 to acute and chronically toxic levels for avian species. Adverse effects to endangered avian and aquatic species are unlikely because of their absence in or around the proposed areas of application.

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