5-13-93

D175491, D175495
DPBARCODE (RECORD)
059101
SHAUGHNESSY NO

REVIEW NO.

EEB REVIEW
MAY 13 1993

DATE IN: 3-12-92 OUT:
ASSIGNED: 3-12-92
CASE # :192476, 038064
SUB. # :S413066, S413068
ID # :62719-221, 39

DATE OF SUBMISSION 2-27-92

DATE RECEIVED BY EFED 3-12-92

SRRD/RD REQUESTED COMPLETION DATE 7-9-92

EEB ESTIMATED COMPLETION DATE 7-9-92

SRRD/RD **ACTION** CODE/TYPE OF REVIEW 330

MRID #(S)

DP TYPE 001

PRODUCT MANAGER, NO. DENNIS EDWARDS 19 CARL ANDREASEN

PRODUCT NAME(S) CHLORPYRIFOS

TYPE PRODUCT

COMPANY NAME DOW ELANCO

SUBMISSION PURPOSE REVIEW PROPOSAL TO USE CHLORPYRIFOS ON CANEBERRIES

COMMON CHEMICAL NAME

REVIEWER: CANDACE BRASSARD

57

Ecological Effects Branch

Chlorpyrifos

100.0 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

Dow Elanco has requested a section 3 registration to use chlorpyrifos formulated as Lorsban 50W in Waster Soluble Packets on caneberries in the United States. Lorsban 50W is currently registered for a multitude of use patterns including almonds, walnuts, filberts, pecans, cole crops, apples, and sour cherries at use rates ranging from 2 lb to 4 lb /A of formulated product.

100.2 Formulation Information
Lorsban 50W

Active Ingredient:
Chlorpyrifos.....50.0%

Inert Ingredients: 50.0%

100.3 Application Methods, Directions, Rates

Lorsban 50W will be applied as a foliar treatment using ground equipment normally used for caneberries at 1.5 lb a.i./A. The label restrictions include 3 spray applications per season or apply the treatments closer than 14 days apart. Please see Attachment A.

100.4 Target Organisms

Raspberry crown borer, obliquebanded leafroller, aphids, omnivorous leaftier, armyworms, cutworms, lygus, sawflies(exposed), strawberry crownmoth, and wintermoth.

100.5 Precautionary Labeling- Environmental

This product is highly toxic to bees exposed to direct treatment. Do not apply during bloom period for caneberries or when bees are foraging in the treatment area.

101.0 Hazard Assessment

101.1 Discussion

According to the 1987 Census of Agriculture, blackberries and raspberries (caneberries that are reported) are grown on 22,163 acres with Oregon, Washington, and California consisting of 51 % of the total acreage grown. A total of 1198 acres of boysenberries are grown throughout the United States.

According to Martin, et. al. 1951, blackberries rank at the very top of summer foods for wildlife. Even the dried or drying berries are eaten to some extent late into the fall or winter, but the principle use is while the fruit is juicy. Another factor to be considered is the widespread availability. Blackberries are important to gamebirds such as grouse, ringnecked pheasant, prairie chicken, bobwhite quail, and others. Principle users include the catbird, cardinal, yellow-breasted chat, pine grosbeak, robin, orchard oriole, summer tanager, brown thrasher, thrushes, and towhees. In addition, the leaves and stems are eaten extensively by deer and rabbits.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Terrestrial Organism Toxicity

Avian Toxicity

Based on the data, chlorpyrifos is very highly toxic to upland game birds, on an acute oral basis, with a reported LD 50 value of 8.41 mg/kg for the pheasant. This insecticide is moderately toxic, on an acute oral basis, to waterfowl species with an LD 50 value of 75.6 mg/kg for the mallard duck.

Chlorpyrifos is highly toxic to both waterfowl and upland game birds on a dietary basis with an LC 50 value of 136 ppm for the mallard duck and a LC 50 value of 423 for the bobwhite quail.

Results from avian reproduction studies conducted with this chemical reveal the NOEL for the mallard was as low as 25 ppm and a NOEL for the bobwhite quail was as low as 125 ppm. Adverse effects observed included locomotor disfunction, and significantly reduced reproductive potential from numbers of eggs laid through number of 14-day old survivors.

A field study(by Hulbert et al.) has been conducted exposing mallard ducklings (6 to 7 weeks of age at first treatment) to various concentrations of chlorpyrifos which had been directly added to the ponds. Mortality was observed at all doses tested, with a 50 % mortality at 0.01 lb a.i./ A (the lowest dose tested).

Another study (Kenega 1968) revealed rabbits and white peking ducks exposed to 0.25 lb. a.i./A in pens demonstrated a 50 % decrease in cholinesterase activity in the ducks.

Mammalian Toxicity

Based on the acute oral toxicity data, chlorpyrifos is moderately toxic to mammals with a reported LD 50 value of 137 mg/kg for the female rat and 163 mg/kg for the male rat.

Aquatic Organism Toxicity

Freshwater Fish Toxicity

Based on the data, chlorpyrifos is very highly toxic to both coldwater and warmwater fish with LC 50 values for rainbow trout as low as 3.0 ppb and as low as 1.8 ppb for the bluegill sunfish. Results from a fish early life stage study indicate a NOEL of 1.6 ppb and a LOEL of 3.2 ppb for the fathead minnow. Results from a full life cycle study indicate a LOEL was as low as 0.12 ppb, and a NOEL was not achieved.

Freshwater Invertebrate Toxicity

Chlorpyrifos is very highly toxic to aquatic invertebrates with LC 50 values ranging from 0.11 to 10 ppb depending on the species. Results from an aquatic invertebrate life cycle study indicate a NOEL of 0.04 ppb and a LOEL of 0.08 ppb.

Freshwater Field Studies

Results from field studies indicated that fish mortality was observed at concentrations as low as 0.01 lb.a.i./A(17% mosquito fish mortality). At label rates of 0.05 lb.a.i./A as much as 100 % mortality was observed in green sunfish) (Chlorpyrifos Second Round Review, Daniel Rieder, December 20, 1988).

Marine Invertebrate Toxicity

Based on the data, it appears this chemical is very highly toxic to marine invertebrates as well. The LC 50 values range from 0.056 ppb to 2000 ppb depending on the species.

Estuarine Field Studies

Field studies have demonstrated that direct application of 0.05 lb a.i./A will kill estuarine minnows and brown shrimp. Affects in another study at this same application rate in tidal plots killed uncaged invertebrates and caged fish. Application rates of 0.025 lb a.i./A have also been known to kill caged mummichogs and reduce their cholinesterase activity by 96 %. (Chlorpyrifos Second Round Review, Daniel Rieder, 12/20/88).

Incident Data

Avian

There have been incidents that have been reported with the use of chlorpyrifos. In 1981, an incident occurred on home lawns in Florida, which resulted in 75 sick or dead robins. In 1991, 32 robins were found dead from exposure to chlorpyrifos as a

57

termiticide in Georgia. In 1991 another 14 robins were found dead from exposure to chlorpyrifos as a termiticide. Another incident was reported in California, where 6 waterfowl were found dead when exposed to carbofuran and chlorpyrifos.

Fish

Near Asheville, NC, approximately 500 juvenile brim were found dead in a pond one day following sub-slab injection of two rooms in a lodge with a total of 48 gallons of a 1% Dursban TC solution. The pond was locate 200 yards from the treated area. It appears the pesticide moved via the drain tile (below the lodge) directly into the pond.

One incident was reported to have occurred in Covington, LA following sub-slab application of four patios which surround a house. The application consisted of a total of 175 gallons of 1% Dursban TC solution. Each of the treated patios has a french drain which flowed directly into a pond approximately 80 feet from the treated home. Water samples were taken and residues were reported to range from 7 ppb to 86 ppb. The applicator believes the pesticide solution leached through the saturated loamy soil from 1 to 3 feet to the French drains. The number of fish found dead was unreported for this incident.

One incident occurred where a small number of minnows, frogs, and crayfish, died in a small stream in Manassas, Virginia following ground-rodding application around the exterior of a house with a total of 50 gallons of a 0.75 % Equity TC solution. The stream was located approximately 40 yards from the treated areas. The home was underlain with drain tile to facilitate drainage. The drain emptied directly into the small stream. Residues were reported to be 83 ppb and 28 ppb.

Lastly, one incident occurred with the use of 1 % Dursban TC as a sub-slab termite treatment. Approximately 500 crappie, bass and catfish were found dead in two interconnected 3 acre ponds that was 30 feet away from the treatment site. Samples were taken 3 days post-application and residues were 4 and 5 ppb.

Environmental Fate and Residues

Chlorpyrifos is reported to have a water solubility value of 2 ppm and the bioaccumulation potential is expected to be 1500 X in rainbow trout (EFGWB, 3/17/92). The hydrolysis data indicate that the half life is 72 days for pH 5 and pH 7 and 16 days for pH 9.

Chlorpyrifos can be applied at a maximum rate of 1.5 lb ai/acre. The following residues would be expected immediately after a single application to cotton (based on EEB's nomograph, Urban, D.J.; Cook, N.J. (1986) Hazard Evaluation

Division, Standard Evaluation Procedure, Ecological Risk Assessment):

Terrestrial Residues

Substrate	Residues (ppm)
Short range grasses	360
Long grasses	165
Leaves and leafy crops	188
Forage (alfalfa and clover, exposed seeds, small insects)	87
Pods containing seeds	18
Fruit	11
Soil (top 0.1 inch) (after direct application)	33 ppb

Aquatic Residues

Using the EEB scenario of a 10-acre field supplying and draining into a one-acre pond 6 feet deep, EEB estimated the highest EEC would be from ground application, which is estimated to be 18.3 ppb. See Attachment A.

Risk Assessment

A. Effects on Terrestrial Organisms

Based on the data, this chemical is highly toxic to both upland game and waterfowl. The residues on short rangegrass are estimated to be 120 ppm. With the LC 50 value of 136 ppm, both the endangered species (1/10 LC 50) and nonendangered species (restricted use) (1/5 LC 50) triggers have been exceeded. The special review criteria (1/2 LC 50) has also been exceeded.

B. Effects on Aquatic Organisms

Based on the data, chlorpyrifos is very highly toxic to estuarine and freshwater fish and invertebrates. The LC 50 values range from 0.056 ppb to 3.0 ppb, depending on the species. Based on an estimated environmental concentration of 18.3 ppb, it is clear that both the endangered species trigger (1/20 LC 50) and the nonendangered species (restricted use)trigger (1/10 LC 50) are exceeded. The special review criteria of 1/2 LC 50 has also been exceeded.

C. Endangered Species Considerations

The use of this chemical may pose adverse effects to both endangered terrestrial and aquatic organisms. EEB has consulted with the USFWS for the following agricultural use patterns: tree crops (fruit, citrus, nut, bananas), field crops (corn, cotton, sorghum, soybeans, alfalfa, clover, mint, sunflowers), many

vegetables (such as asparagus, beans, cucumbers, cole crops, onions, peanuts, rutabaga, strawberries, sugar beets, sweet potatoes, turnips), grapes, cranberries, and tobacco. Attachment B lists the endangered species that were identified to be of concern from the use of chlorpyrifos (Exton, M. 1993, Personal Communications).

In addition, the USFWS has provided information on endangered species that may be affected from various pesticides in agricultural regions growing blackberries , boysenberries, and raspberries. Attachment C is the list of endangered and threatened species that occur in counties where raspberries and blackberries are grown (Exton, M. 1993, Personal Communications).

101.4 Adequacy of Toxicity Data

No data were submitted with this section 3 registration request. However, there were adequate data to complete a risk assessment.

101.5 Adequacy of Labeling

The following labeling must be required:

This pesticide is highly toxic to wildlife, fish and aquatic invertebrates. This pesticide has killed fish and birds for other uses. Birds feeding in treated areas may be killed. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate. Netting is encouraged to prevent exposure of the pesticide to birds.

102.0 Classification

Since all the criteria have been exceeded, including restricted use, this chemical must be considered a "restricted use" pesticide.

103.0 Conclusions

EEB has completed the review of the section 3 request to use chlorpyrifos on caneberries. It is clear from the data and the estimated exposure, the use of this chemical may pose a risk to fish, aquatic invertebrates and wildlife, especially birds. These impacts include mortality to birds feeding in treated areas and fish swimming in waters receiving drift or runoff from treated fields. Chronic impacts to terrestrial and aquatic organisms are also possible since chlorpyrifos is persistent and chronically toxic at long-term exposure levels.

Based on all the information provided, this chemical should be considered a "restricted use" chemical. Restricted use would limit use to those especially trained in the correct application procedures. Thus, it should limit hazardous exposure that would be due to misuse such as over-application, treatment of non-target sites, application when conditions favor transport of chlorpyrifos off the treated site, or failure to follow risk reduction measures.

When reviewing the other use patterns and application rates that chlorpyrifos is currently registered for, it is clear that this proposed use is minor compared to all the acreage chlorpyrifos is currently registered on. In other words, on an incremental basis, this use is not expected to significantly increase the risk to nontarget organisms.

EEB determined that the average blackberry and raspberry farm are 3 acres each (1987 Census of Agriculture). In areas where there is a high bird population EEB recommends that netting be utilized to not only protect the crop but to also protect the birds from exposure to the pesticide. Netting has been used in small farms, i.e. blueberries in New England to prevent wildlife from eating the berries. In this case we are recommending that netting be used on small farms in order to prevent wildlife from being exposed to chlorpyrifos, a highly toxic pesticide to wildlife, which will be applied to the foliage of the caneberries.

To increase the possibility of finding out about bird or fish dieoffs, should they occur, the EEB suggests that the label vividly show a telephone number where people can call if they see birds or fish that they think were killed by chlorpyrifos. The following is an example of wording:

"If any one sees dead birds or fish which may have been killed by chlorpyrifos, please call ..."

The number could be either the Registration Division, the EPA regional office, or the Lead Agency(i.e., generally state agriculture department) in each State. The contractor that operates the National Pesticide Telecommunications Network (NPTN) toll-free number is capable of taking such calls, but they may not be prepared to handle a significant increase in calls, since they have to operate within a budget. A disadvantage of providing an EPA number is that EPA is not equipped to initiate on-site investigations so the report would have to be passed on to an agency capable of doing such field visits. The advantage of providing an EPA number is that we would be assured of at least learning about incidents when they occur and we would know to whom each was transferred.

If you have any further questions with regards to this review, please feel free to contact Candy Brassard at 305-5392. Thank you for the opportunity to comment.

Candace A. Brassard, Biologist 5/11/93
Ecological Effects Branch
Environmental Fate and Effects Division (H-7507-C)

Daniel Rieder, Head-Section III for Dan Rieder 5/11/93
Ecological Effects Branch
Environmental Fate and Effects Division (H-7507-C)

Anthony F. Maciorowski, Chief 5/13/93
Ecological Effects Branch
Environmental Fate and Effects Division (H-7507-C)

CITATIONS

Martin, Alexander, Herbert Zim, and Arnold Nelson. 1951. American Wildlife and Plants A Guide To Wildlife Food Habits. Dover Publications, Inc. New York.

Rieder, Dan. 1988. Second Round Review for Chlorpyrifos. Ecological Effects Branch, Environmental Fate and Effects Division. EPA. Washington, D.C.

Exton, Margary. 1993. Personal communications. Endangered Species Specialist. Environmental Fate and Effects Division, Office of Prevention, Pesticides, and Toxic Substances. EPA, Washington. D.C.

United States Department of Commerce. 1987. Census of Agriculture. Volume 1. Geographic Area Series. Part 51. United States Summary and State Data.

Urban, Douglas and Norm Cook. 1986. Ecological Risk Assessment. Standard Evaluation Procedure.EPA-540/9-85-001. EPA, Washington, D.C.

Attachment A

EEC CALCULATION SHEET

I. FOR FOLIAR APPLICATION

- Runoff

1.5 lb x	0.02 (2% runoff)	x	10 (A) (from 10 A drainage basin)	=	0.3 lb (tot. runoff)

EEC of 1 lb ai direct application to 1 A pond 6-foot deep = 61 ppb.

Therefore, EEC = 61 ppb x 0.3 (lb) = 18.3 ppb