EEB

121301
SHAUGHNESSEY NO.

1
REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 6-17-82 OUT 9-20-82

FILE OR REG. NO. 100-AGE, 100-AGR

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 6/7/82

DATE RECEIVED BY HED 6-17-82

RD REQUESTED COMPLETION DATE 10-7-82

EEB ESTIMATED COMPLETION DATE 9-30-82

RD ACTION CODE/TYPE OF REVIEW 110/New Chemical Food/Feed Use

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

DATA ACCESSION NO(S). 070912; 070913

PRODUCT MANAGER NO. A. Heyward (17)

PRODUCT NAME(S) Technical Cyromazine

Larvadex 0.3% Premix

COMPANY NAME Ciba-Geigy

SUBMISSION PURPOSE Proposed Full Registration of Formulation Use Label and Fly Control Around Poultry Use Labels

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
121301	Cyromazine. N-Cyclopropyl-1,3,-5 triazine - 2,4,6-triamine	95
	Larvadex. (Cyromazine)	0.32

10

Pesticide Name(s): Technical Cyromazine
Larvadex Premix

100 Pesticide Label Information

100.1 Pesticide Use

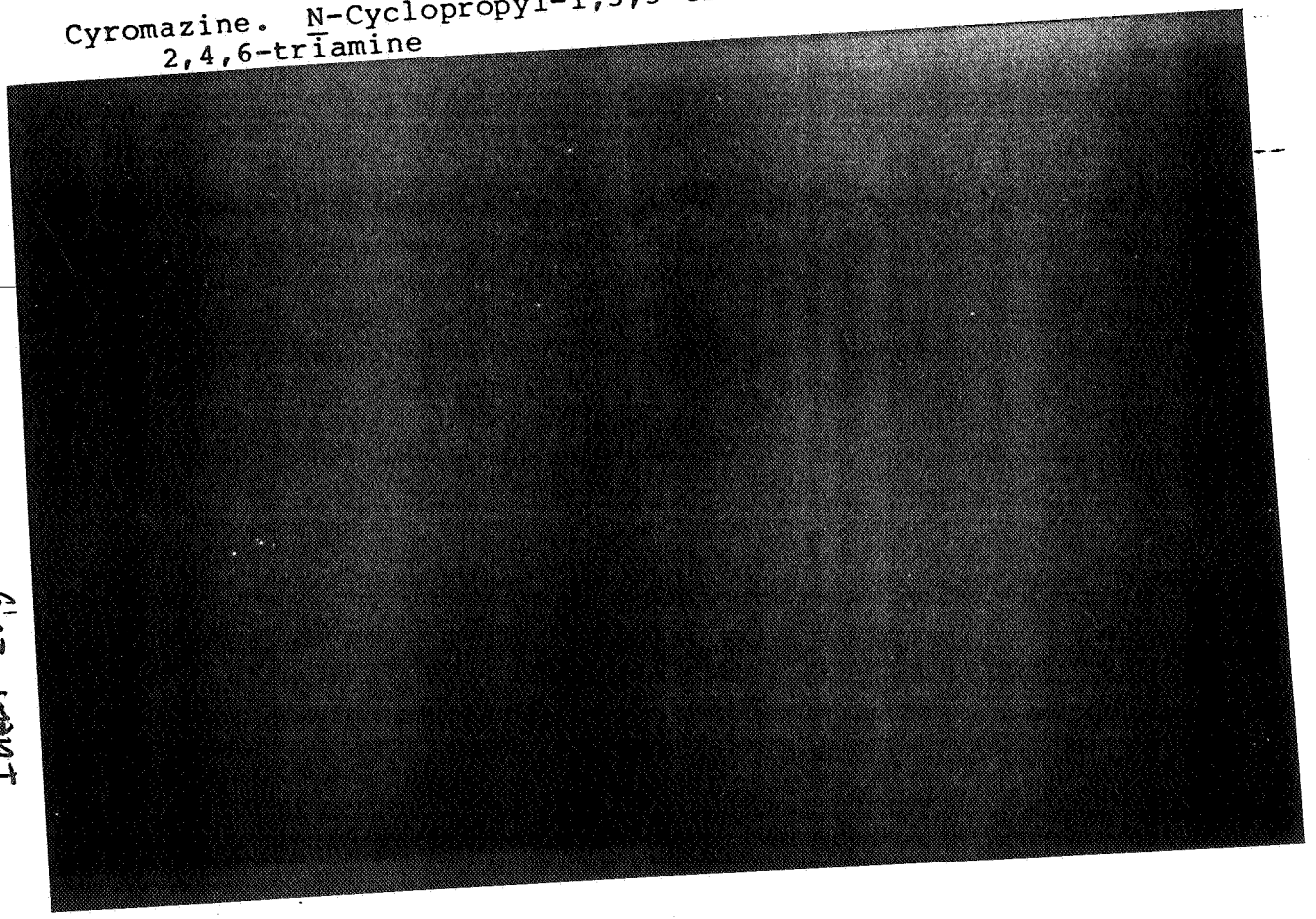
Technical Cyromazine - An insecticide for formulating into registered end use products for nondomestic indoor/outdoor use.

Larvedex Premix - An insecticide for fly control around poultry.

100.2 Formulation Information

INGREDIENT STATEMENT FOR CYROMAZINE
(Technical)

Component	% By Weight
Cyromazine. N-Cyclopropyl-1,3,5-triazine-2,4,6-triamine	95 minimum



Inert Ingredients

LARVADEX PREMIX

Component	% By Weight
Cyromazine Technical, 95% a.i.	0.32
[redacted]	

Inert Ingredients

100.3 Application Methods, Directions, Rates

Technical Cyromazine -

Instructions for Formulation

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

This pesticide may be used only for formulation of cyromazine-containing products for insecticidal use and only by authorized formulators. Refer to appropriate technical bulletins furnished by CIBA-GEIGY for instructions for formulation and other information.

Larvadex Premix -

Directions for Use

Blending and Feeding

Housefly, soldier fly: Mix 1 lb. of Larvadex 0.3% Premix per ton of feed. Feed the treated feed as a daily ration. Begin feeding when adult flies become active and continue treatment through the fly season.

Lesser housefly: Mix 3.33 lbs. of Larvadex 0.3% Premix per ton of feed. Feed the treated feed as a daily ration. Feed at this rate for as long as this pest is a problem.

Follow proper cultural and equipment control around the poultry houses. Larvadex will give best results when integrated into a well-managed fly control program.

Note: Do not feed Larvadex treated feed to broiler poultry or poultry producing eggs for hatching purposes.

100.4 Target Organisms

Larvadex 0.3% Premix -

House fly
Soldier fly
Lesser housefly

100.5 Precautionary Labeling

Technical Cyromazine -

Precautionary Statements

Environmental Hazards

Do not discharge into lakes, ponds, streams, or public waters unless in accordance with an NPDES permit.

Storage and Disposal

Do not contaminate water, food, or feed by storage or disposal practices.

Pesticide Disposal: Pesticide that cannot be used according to label instructions must be disposed of according to applicable federal, state, or local procedures.

Container Disposal: Do not reuse container. Dispose of liner and container in a sanitary landfill, or burn if allowed by state and local authorities.

Larvadex 0.3% Premix -

Precautinary Statements

Enviornmental Hazards

Keep out of lakes, ponds, or streams. Do not contaminate water by cleaning of equipment or disposal of wastes.

Storage and Disposal

Do not cantaminate water, food, or feed by storage or disposal practices.

Pesticide Disposal: Pesticide or mixtures that cannot be used according to label instructions must be disposed of according to federal, state, or local procedures.

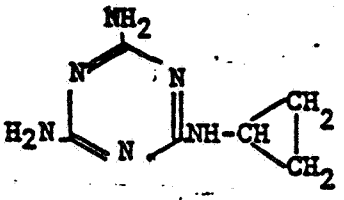
Container Disposal: Dispose of empty bags in a sanitary landfill or by burning if allowed by state and local authorities.

101 Physical and Chemical Properties

101.1 Chemical Name

N-Cyclopropyl-1,3,5-triazine-2,4,6-triamine

101.2 Structural formula



101.3 Common Name

Cyromazine; CGA-72662

101.4 Trade Name

None assigned

101.5 Molecular Weight

166.19

101.6 Physical State (technical product)

White
Odorless
Crystalline solid

Melting Point:	220 - 222°C
Boiling Point:	Not applicable
Vapor Pressure:	$\leq 10^{-6}$ Torr @ 20°C
Density	1.35 g/cm^3 @ 20°C

Hydrolysis:

0.1M Buffer	pH	Temp.	Time	% Hydrolysis
Acetate	3	100°C	6 hours	0
Phosphate	7	"	"	0
Ethanolamine	10	"	"	0

101.7 Solubility

@ 20°C

Water	1.1%	(These data are for the technical product)
Methanol	2.2%	
Acetone	0.17%	
Toluene	0.01%	
Hexane	0.01%	
n-Octanol	<0.22%	

Soluble in weakly polar organic solvents

102 Behavior in the Environment

No EFB report was available. Information below was taken from Ciba-Geigy submission of supporting information to RD. RD forwarded some of the written material with the fish and wildlife data submission (Acc. # 070912) but material was not actually part of Acc.# 070912 per se. None of the information in Sec. 102 has been validated by HED to date.

102.1 Soil

Because of the unique administration of cyromazine in the diet of poultry as a feed-through insecticide and the likelihood of the direct application of poultry manure containing cyromazine residues to agricultural soils (pasture and cropland), studies were conducted in order to determine potential residues resulting from this practice.

"Two such trials were conducted in which manure from chickens administered cyromazine at the 5 ppm (1X) use rate was spread on pastures. Analyses were carried out on the manure and grass. Maximum combined residues of cyromazine and melamine were 22 ppm in manure, and 1.2 ppm in or on the pasture grass immediately after application. Rapid depletion was observed. No residue (<0.05 ppm cyromazine) was found in the soil."

"Degradation under aerobic laboratory conditions in a soil-manure mixture yielded an approximate half-life of about one year while under field/greenhouse conditions, the approximate half-life in soil-manure was 12 weeks."

102.2 Water - -"No significant hydrolysis at pH 5,7 and 9" .....H_2O temps "ranging form 30° - 70°C for ....28 Days."

Hydrolysis and photolysis studies indicate that photolysis is the most imprtant physico-chemical degradation mechanism. No photodegradation of CGA-72662 occurred in nonsensitized aqueous solutions within the exposure period of 168 hours. The aqueous photolysis half-life was ten hours in the presence of a photosensitizer which would simulate the waters of natural ecosystems. CGA-72662 was resistant to hydrolysis at 70°C over the pH range of 1 to 13."

'The runoff model (SWRRB) and the EXAMS Model were used to determine the potential exposure of aquatic organisms to CGA-72662 occurring in aquatic environments as a result of potential runoff of CGA-72662 from agricultural watersheds. The maximum concentration of CGA-72662 that would occur in aquatic environments after a worst case, i.e., a catastrophic rainfall, was 5.4×10^{-5} ppm."

102.3 Plant

"CGA-72662 is not expected to accumulate to detectable levels in crops grown on soil amended with manure containing residues of CGA-72662. Based on maximum usage, concentrations of CGA-72662 in soil-manure layers are not expected to exceed 0.05 ppm and levels in plants in a soil-manure mixture are not expected to reach 0.05 ppm under field conditions.

Studies involving the broadcast spreading of chicken manure containing CGA-72662 (18 g ai/A) indicate rapid CGA-72662 dissipation from pasture grass.

CGA-72662 dissipated from pasture grass with an average half-life of three days (r^2 >0.9)"

102.4 Animal

"The propensity of CGA-72662 to accumulate in fish is low. Study results indicate that CGA-72662 accumulated in whole bluegill sunfish with a maximum bioconcentration factor of less than 1X."

'Two three-level chicken feeding studies were conducted. The first test used rates of cyromazine in the feed of 2.5 ppm (0.5X), 5 pm (1X) and 25 ppm (5X). The second test used rates of 5 ppm (1X), ppm (5X) and 50 ppm (10X). Eggs and tissues from these studies were analyzed to determine parent cyromazine and its metabolite, melamine (second test only). Residues in eggs reached plateau levels in 3-4 days. The plateau level of combined residues of cyromazine and melamine in eggs from chickens treated at the 1X rate was 0.20 $\pm$ 0.04 ppm with a maximum combined residue of 0.27 ppm."

'Maximum combined residues of cyromazine and melamine in tissues from chickens treated at the 1X rate were: fat - 0.20 ppm, skin - 0.13 ppm, lean meat - 0.17 ppm, and liver - 0.20 ppm."

'Animal metabolism studies were conducted in which poultry, rats and a lactating goat were administered 5 ppm to 7.7 ppm (1X rate) of radioactive cyromazine (Δ^{14}C-CGA-72662) in the feed. Most tissue levels were less than 0.01 ppm total ^{14}C expressed as Δ^{14}C-CGA-72662. Exceptions were in the dynamic tissues of liver, kidney and gastrointestinal tract with levels as high as 0.25 ppm (goat liver). In eggs (white and yolk), the total radioactivity ranged from 0.12 to 0.20 ppm (calculated on a whole egg basis). This residue consisted predominantly of unaltered cyromazine (18%-60% in whites, 69%-70% in yolks), and its dealkylated metabolite, melamine, 1,3,5-triazine-2,4,6-triamine (<10%-38% in whites, <10% in yolks). In chicken liver, unaltered cyromazine accounted for 62% of the total ^{14}C residue and melamine accounted for 7% (1X rate)."

'In the goat, milk contained 0.012 to 0.019 ppm of total ^{14}C with an average of 0.017 ppm over a 10-day period. Most of the radioactivity (87%) fractionated into whey where 15% was characterized as unaltered cyromazine and the ramaining as two unknwon metabolites. The goat liver (0.25 ppm) had <1% unaltered parent and 75% of an unknown metabolite (zone 4), also found in the milk whey (38%)."

'Poultry, rats, and the goat excreted unaltered cyromazine. In percentage of administered dose, chickens excreted about 75%, rats excreted 79% inurine, and the goat excreted 54% in the urine and 2% in the feces."

'Since the levels of residues to which grazing animals might be exposed are less than the 5 ppm feeding level of the goat study, nondetectable levels of residues are expected in milk and tissues of cows grazing on pasture fertilized with treated manure."

102.5 Microorganisms

"CGA-72662 did not have a detrimental effect on soil microbial functions at 100 ppm in soil. In fact, CGA-72662 stimulated most microbial functions such as nitrification, nitrogen fixation and respiration. The presence of CGA-72662 at 100 ppm did not affect the cellulose, starch or protein degrading

mechanisms of soil microbes. CGA-72662 did not alter the operating characteristics of a simulated waste water treatment process. CGA-72662 is more mobile than monuron in Vetroz sandy loam and Collombey sand soils, and less mobile than monuron in soils such as Evouettes silt loam and Lakeland sand. Q values (K_{om}) ranged from 23.6 to 107.5 with an average of 61.9."

103 Toxicological Properties

103.1 References from Toxicology Branch

No references from Toxicology Branch/HED were available for this review. The following information was taken from Ciba-Geigy's submitted written material to RD in support of tolerance petition, but to date this material has not been validated by TB/HED.

"Many of these studies have been submitted to EPA in support of PP 9G2230 necessary for experimental use permit authorization, and include the following:

90-Day Toxicity Study in Albino Rats
(EPA Accession NO. 098385
Conclusion - No adverse effect was elicited by CGA-72662 when fed at levels up to and including 1,000 ppm in diet. The no observable effect level (NOEL) for the study was 1,000 ppm. (See results of two-generation reproduction study confirming NOEL level of 1,000 ppm.)

90-Day Subacute Oral Toxicity in Beagle Dogs
(EPA Accession No. 098385)
Conclusion - No adverse effect was observed in dogs fed CGA-72662 for 13 weeks at dietary levels up to and including 1,000 ppm. The NOEL for the study was 1,000 ppm.

6-Month Subchronic Toxicity Study in Dogs
Conclusion - Beagle dogs fed for 26 weeks at 30, 300, and 3,000 ppm revealed no distinct treatment-related findings with respect to clinical signs, opthalmologic examination, or gross and macroscopic pathology. The NOEL for CGA-72662 technical was 30 ppm, based primarily upon the decrease of hematocrit and hemoglobin values at the high dose levels."

"Rat Teratology Study
Conclusion - CGA-72662 dosed at 0, 100, 300, and 600 mg/kg/day was not teratogenic when administered orally to rats. Some maternal toxicity symptoms were observed at 300 and 600 mg/kg/day levels."

"Rabbit Teratology Study
Conclusion - Dose levels of 0, 25, 50, and 75 mg/kg/day and 0, 10, 30, and 60 mg/kg/day of CGA-72662 were fed in two experiments. No biologically meaningful or statistically significant differences in the mean number of corpora lutea, fetal sex distribution or mean fetal body weight occured inthe 25, 50, or 75 mg/kg/day groups or in mean postimplantation loss in the 25 and 50 mg/kg/day groups. Treatment related malformations did not occur in Experiment I.'

'In Experiment II, no biologically meaningful or statistically significant differences in the mean numbers of corpora lutea, total implantation, postimplantation loss, viable fetuses, or the fetal sex distribution in any of the treated groups compared to the control. Some developmental and genetic variations were observed, but were comparable with those cited in the historical control. The significance of these observations appears to lack a true effect since they were not observed in Experiment I at higher dose levels. The frequency of these malformations (1-5%) is a typical of teratogenic induction. Therefore, CGA-72662 was not teratogenic at the highest tested dosage of 75 mg/kg/day."

"Two-Generation Reproduction Study in Albino Rats
Conclusion - CGA-72662 administered to male and female rats over two generations at dosage levels of 0, 30, 1,000; and 3,000 ppm in the diet over a 55 week period, revealed effects on parental rats and their offspring. The effects at the 1,000 and 3,000 ppm levels consisted of decreased parental body weights and food consumption. Pup body weight decreased at the 3,000 ppm level. The NOEL for reproductive parameters was 1,000 ppm, while a 30 ppm NOEL was observed for dietary dosage based on change in weight and food consumption.'

'Salmonella/Mammalian Microsome Mutagenicity Test
Conclusion - No evidence of the induction of point mutations by CGA-72662 or by the metabolites of the substance formed as a result of microsomal activation was detectable.'

'Dominant Lethal Study - Mouse
Conclusion - No evidence of a dominant lethal effect was observed in the progeny of male mice treated with CGA-72662.'

'Nucleus Anomaly Test
Conclusion - No evidence of mutagenic effects was obtained in Chinese hamsters treated with CGA-72662.'

'Evaluations of the chronic toxicity and oncogenicity potentials of CGA-72662 were conducted using an Oncogenicity Study in Mice and the 2-Year Chronic and Oncogenicity Study in Rats. Twelve-month interim reports are presented in support of this petition. To date, the following observations have been reported:

Oncogenicity Study in Mice
No evidence of oncogenicity caused by CGA-72662 has been observed in mice receiving the compound at dosage of 50, 1,000 and 3.000 ppm in their diets. A NOEL based upon other toxic signs, namely reduced body weight, is 50 ppm.

Two-Year Chronic and Oncogenicity Study - Rats
No evidence of oncogenicity caused by CGA-72662 has been observed in rats receiving the compound at 30, 300, and 3,000 ppm in their diets. A NOEL based upon body weight changes is 30 ppm."

103.2 Minimum Requirements

103.2.1 Avian Acute Oral LD50

Species	LD50	Validation Category	Acc. #
Mallard Duck	>2510 mg/kg	Core	070912
Bobwhite Quail	1785(1444-2206)mg/kg	Core	070912
Peking Duck	>6000 mg/kg	Invalid	070912

103.2.2 Avian Dietary LC50

Species	LC50	Validation Category	Acc. #
Mallard Duck	>5620 ppm	Core	070912
Bobwhite Quail	>5620 ppm	Core	070912

103.2.3 Fish Acute LC50 (96-hr.)

Species	96 hr. LC50	Validation Category	Acc.#
Bluegill Sunfish	>89.7 mg/l	Core	070912
Rainbow TRout	>87.9 mg/l	Core	070912
Channel Catfish	>92.4 mg/l	Supplemental	070912

103.2.4 Aquatic Invertebrate LC50

Species	48 hr. - LC50	Validation Category	Acc.#
Daphnia magna	> 97.8 mg/l	Supplemental	070912

104. Hazard Assessment

104.1 Discussion

Action

The mode of action of Larvadex (Cyromazine) is unknown. The Registrant suggests that there is reason to believe that larvicidal effects are not due to direct interference with cuticle formation and chitin disposition. They further suggest that this chemical may act at the hormonal level leading to retardation of larval growth, death and inability of the pest to moult. Cyromazine is not observed to be acutely toxic to fly larvae, but must be ingested or kept in contact with the pest for some length of time, to allow the insect growth regulator activity to be effective.

Rates

The maximum rate in treated poultry feed is 5 pm CGA-72662 (technical Cyromazine). Treated feed is given daily beginning when adult flies become active, and continuing through the fly season. Larvadex is also applied to animal manure as a surface spray at rates of 0.05 to 0.1% concentration in 0.5 to 1 gallon per 100 square feet. Applications may be repeated as needed at 14-day intervals (see Reference, next page).

Persistence

Cyromazine was stable in chicken manure during a 21-day study, but was metabolized slowly in cow manure to about 70% of original concentration in 21-days (radioactive assays). Cyromazine dissipates "rapidly" from pasture grass under

field conditions (applied at 0.04 lb ai/A by spray and 18 g. ai/A in chicken manure). Average half-life was 3 days for both applications. Half-life of Cyromazine in loam soil-manure was 1 year under laboratory conditions and 12 weeks under field/greenhouse conditions.

Leaching and binding (soils) -

Unvalidated studies submitted under Acc.# 070912 show the parent compound cyromazine is mildly basic and has a low propensity for leaching into slightly acidic sandy soils. Metabolic products (particularly melamine) have the same mobility. Adsorption and desorption studies showed that soil binding is not readily accomplished.

Reference for Rates -

Ballatine, Larry. 1982. CGA-72662: Environmental Impact Statement, Report No.: EIR-81014, p.3 in Reference #7, Accession #070912.

Accumulation -

a.) Crop -

Parent and metabolites will not accumulate in crops grown in soil onto which manure containing cyromazine has been applied (according to unvalidated fate studies). The recommended rate of manure application is 5 tons/A, contiaining 5 ppm cyromazine, thus 5 ppm/A would be the application rate for the parent compound to agricultural fields. This results in crop levels of <0.05 ppm cyromazine (lettuce, carrots, spring wheat).

b.) Fish -

Actual laboratory studies (unvalidated) showed a Bioconcentration factor (BCF) of < 1X for Bluegill sunfish (edible and non-edible) with elimination of residues after day 3 of exposure. Potential BCF in catfish was estimated to be <1X, based on correlation of bluegill BCF, simulated catfish ecosystem studies (where EEC = 0.003 ppm), and correlation of potential accumulation in catfish with water solubility and octanol/water partition coefficients of cyromazine.

Unvalidated simulations based on the equations of Ellgehousen et al (14), Chiou et al (12) Neely et al (42) and Kenga and Goring (37) showed the following (references in parentheses are those listed in Acc. # 070912 - Reference #7 p. 41-47):

Species	BCF	Source
[Bluegill]	[<1X]	[experimental]
Catfish	0.02 X	Calculated; Octanol/water
Trout & Mosquito fish	7.8 X	Calculated; water solubility
Trout Muscle	1.2X	Calculated; octanol/water
Fish (general)	0.03X	" "
" (")	2.7X	" ; water solubility
" (")	0.5X	" ; octanol/water

C. Aquatic Ecosystems

(modeling studies)

The potential runoff of Cyromazine from a Georgia watershed (Watkins 2) was estimated using the runoff model-Pesticide Runoff Simulation (SWRRB). The SWRRB Model yielded a runoff load (lbs. per acre) of Cyromazine which was then input into EXAMS (Exposure Analysis Modeling System) to determine maximum concentration of Cyromazine in the water column and bottom sediments of an adjacent pond, a eutrophic lake and an oligotrophic lake into which the watershed emptied directly. Half-lives and self-purificaition times were also calculated. (The Environmental Fate Branch has not yet commented on Ciba-Geigy's treatment of these models, nor on the validity of the max. EEC's summarized below).

Assumptions for SWRRB

- OM content of soil averaged 1.3% after discing five (5) tons per acre of manure into the top three (3) inches of soil. (the manure rate is that usually recommended by Ag. Ext. Service for chicken manure).
- 0.05 ppm cyromazine in top 0-3 inches soil; 0.017 ppm in top 0-1 inch soil (from crop studies).
- minimal foliage on field prior to application of manure.
- manure applied on Julian Day # 178 of calendar year, the day of a four (4) inch rainfall in Watkinsville, Ga., in 1974, providing a "worst case" runoff situation. No degradation of cyromazine prior to runoff.
- watershed = 3.2 acres.

Results of SWRRB - (for input into EXAMS)
total annual runoff of Cyromazine = 0.004 lbs per acre.
= total load = 3.2 x 0.004 lbs = 0.0128 lbs.

EXAMS was used to estimate worst case maximum EEC of Cyromazine found in a pond, eutrophic and oligotrophic lakes from runoff of 0.004 lbs/A in Watkins 2 watershed after a major rainfall (4").

EXAMS Load Input Data -Pond 2.5A; 6.6. Ft deep

- Weight water = 4.46×10^7 lb (Ww) | (16.5 acre ft.) ($H_2O = 0.270 \times 10^7$ lb per acre-ft.)
- " sediment = 1.49×10^6 lb (Ws)
- load partition (water) = 0.0125 lb. (Zw)
- load partition (sediment) = 0.003 lb. (Zs)

EEC pond water = 2.8×10^{-4} ppm (EECw)
EEC pond sediment = 0.00 ppm (EECs)

Non point source flow rate (NPSFL) =
5.1×10^3 kg/hr.

Non point source loading rate (NPSLDG) =
NPSLDG = EECw x NPSFL $\times 10^{-6}$ kg/hr =
2.8×10^{-4} ug/g x 5.1 to 10^3 kg/hr x 10^{-6} g/ug
$= 1.43 \times 10^{-6}$ kg/hr.

EXAMS Load Input Data - Eutrophic Lake

Ww = 5.57×10^8 lb.
Ws = 7.45×10^6 lb.
Zw = 0.0128 lb.
Zs = 0.000

EECw = 2.3×10^{-5} ppm
EECs = 0.00 ppm

(Dimensions of lake were not listed in submission but presumably taken into account during calculation of weight of water by model. H_2O at 0.270×10^7 lb/acre-ft. would mean this lake = 206.3 acre-ft)

NPSLDG = 1.13×10^{-6} kg/h

EXAMS Load Input Data - Oligotrophic Lake

Ww = 5.57×10^8 lb.
Ws = 7.45×10^6 lb.
Zw = 0.0128 lb.
Zs = 0.000

H_2O at 0.270×10^7 lb/acre-ft; lake = 206.3 acre-ft. actual dimensions not given in submission.

NPSLDG = 1.13×10^{-6} kg/hr.

Input Data for EXAMS Model for Cyromazine

1. Molecular weight - 166.19
2. Solubility = 15,000 ppm

3. Kd = 0.8 at 1.3% OM for watershed
4. $K_{o}w$ = 0.8
5. Vapor pressur = 10^{-6} torr
6. Reaction quantum yield = 0.3
7. Direct photolysis rate = 0
8. Reference latitude for rate constant deg. fract. = 32
9. 2nd order rate constant - acid hydrolysis dissolved = O
10. Rate constant neutral hydrolysis dissolved = 0
11. 2nd order rate constant for sediment biolysis = $1.7 \times 10^{-11} \frac{100 \text{ g.}}{\text{hr. cells}}$

Calculation of second order rate constant:

(from soil studies) (t 1/2 = 12 weeks = 2,016 hr.

$$t\ 1/2 = \frac{0.693}{k} \text{ first order}$$

(from soil studies) $k = \frac{0.693}{2016 \text{ hr.}} = 3.4 \times 10^{-4} \text{ hr}^{-1}$

2×10^{7} bacteria cells/100 g sediment

$$\text{Second Order} = \frac{k}{2 \times 10^{7} \text{ cells}/100\text{g}} = 1.7 \times 10^{-11} \frac{100\text{g}}{\text{hr. cells}}$$

12. NPSLDG pond = 1.43×10^{-6} kg/hr.
13. NPSLDG eutrophic lake = 1.13×10^{-6} kg/hr
14. NPSLDG oligotrophic lake = 1.13×10^{-6} kg/hr

EXAMS Results

POND (16.5 acre - ft)

Exposure:

A. Max conc. water = 5.4×10^{-5} mg/l dissolved
Max conc. - bottom sediments = 4.9×10^{-6} mg/l dissolved in pore water

B. Biosorption - max conc. - plankton 0.0 ug/g
Benthos 0.0 ug/g

C. Max. told Conc. in sediment Deposits: 2×10^{-6} mg/kg (Dry weight)

Fate:

A. Total Steady State Accumulation: 1.1×10^{-3} kg; 99.8% in water column
0.12% in bottom sediments

B. Total Load: 3.4×10^{-5} kg/day -disposition: 0.00% via Chemical transformation; 0.00% Biotransformed; 0.00% volatilized; 100% exported via other pathways

Persistence:

A. At end of 48-day recovery period, - water column had lost 78.40% initial toxicant burden; the sediment loss 72.37% initial burden

B. System self-purification time = approx. 4 months

Eutrophic lake (206.3 acre-ft)

Exposure:

A. Max conc. - water = 1.2×10^{-6} dissolved
max conc. - bottom sediments - 2.1×10^{-8} mg/l dissolved in pore water

B. Biosorption - max conc. - plankton 0.0 ug/g
Benthos 0.0 ug/g

C. Max total conc. in sediment deposits: 8×10^{-9} mg/kg (Dry weight)

Fate:

A. Total Steady - State Accumulation : 6.4×10^{-3} kg; 100% in water, 0.00% in bottom sediments

B. Total Load: 2.7×10^{-5} kg/Day - Disposition: 0.00 % via Chemical transformation; 0.00% Biotransformed; 0.00% volitilized; 100% exported via other pathways

Persistence:

A. At end of 324-day recovery period - water column lost 74.21% of initial toxicant burden - sediment lost 69.28% initial burden

B. System self-purification time = approx. 27 months

Oligotrophic lake (206.3 acre - ft)

Exposure:

A. Max conc - water = 1.2×10^{-6} mg/l dissolved
max conc. - Bottom sediments: 2.0×10^{-8} mg/l dissolved in pore water

B. Biosorption - max. conc. - Plankton: 0.0 ug/g
Benthos: 0.0 ug/g

C. Max total Conc. in sediment deposits: 7.6×10^{-9} mg/kg (dry weight)

Fate:

A. Total steady - state Accumulation: 6.4×10^{-3} kg; 100% in water column, 0.00% in Bottom sediments

B. Total Load: 2.7×10^{-5} kg/day - disposition: 0.00% via Chemical transormations; 0.00% Boitransformed; 0.00% volatilized; 100% exported via other pathways.

Persistence:

A. At the end of a 324-day recovery period, the water had lost 74.20% of its initial toxicant burden; the sediments had lost 100.00 of their initial burden

B. System self-purification time - approx. 27 months

104.2 Liklihood of Adverse Effects to Non-target Organisms

A summary of the (unvalidated) environmental chemistry factors to be considered in this hazard assessment indicates that:

- cyromazine is stable to hydrolysis; photolysis is the dominant physico - chemical degradation mechanism. Cyromazine is not expected to build up in soils; at 5 ppm in chicken manure (5 tons/A) <0.05 ppm cyromazine is expected in soils. Half-lives in soil-manure are 1 year (lab) and 12 weeks (field/greenhouse).

- Cyromazine is not expected to build up in plants or crops; <0.05 ppm is expected from typical chicken manure applications.

- Cyromazine is not expected to build up in animal tissues; fish BCF's are expected to be between 0.2 - 7.8X.

- Cyromazine has no detrimental effects on soil microorganisms

- Cyromazine is has low to moderate mobility in sandy or loam sand soils.

Since the proposed use pattern of Cyromazine (Larvadex 0.3% Premix) is such that the maximum concentration in soil-manure of an agricultural field is expected to be 0.05 ppm, runoff of this chemical from typical fields treated in this way may result in expected (maximum) concentrations in typical ponds and lakes of about 10^{-5} ppm or .01 ppb.

The above aquatic exposure estimates are compared to maximum acute toxicity values for aquatic organisms of 100 mg/l for all aquatic indicator species (100,000 ppb). This gives a safety factor of 10^6 - 10^7.

Cyromazine is (acutely) practically non-toxic to mammals and birds. Exposure estimates for these organisms are <0.05 ppm. Acute toxicity for birds is 1785 ppm maximum. Safety factor is 10^5 = 10^6 for birds. Acute toxicity for mammals is 1000 ppm maximum. Safety factor is again 10^5 - 10^6.

Based on these calculations and the environmental chemistry data there is no expectation of unreasonable adverse effects to nontarget organisms from the use of Cyromazine in Larvadex 0.3% Premix for fly control around poultry.

104.3 Endangered Species Considerations

Because there is only a neglible exposure estimate with a 10^6-10^7 safety factor for both aquatic and terrestrial species, there will be no endangered species consultation for this use pattern.

104.4 Adequacy of Toxicity Data

Data submitted under Acc. #070912 is considered here.

Avian Acute LD50 studies

Mallard Duck LD_{50} >2510 mg/kg
Beavers and Fink. 1980.
Adequate to support full registration.

Bobwhite Quail LD_{50} = 1785 mg/kg (1444 - 2206 mg/kg)
Beavers and Fink. 1980.
Adequate to support full registration

Peking Duck LD_{50} >6000 mg/kg
Aschsse and Ullman. 1978.

Inadequate study. Does not support any registration. Do not use for hazard assessment. This study is merely a summary with minimal dose-response information. No controls were reported. Most study parameters normally assessed were not reported.

Avian Dietary LC50 studies

Mallard Duck LC_{50} >5620 ppm
Beavers & Fink. 1980.
Adequate to support full registration

Bobwhite Ouail LC_{50} > 5620 ppm
Beavers & Fink. 1980.
Adequate to support full registration

Fish Acute toxicity (96-hr LC50's)

Bluegill Sunfish LC50 >89.7 mg/l
Schupner, Vilkas, Buck. 1981.
Adequate to support full registration. Although the study did not exactly demonstrate an LC_{50} > 100 mg/l as called for in the guidelines, it fulfills the intent to the fullest degree especially considering the max. EEC's for the poultry fly control use pattern.

Rainbow Trout LC_{50} >87.9 mg/l
Schupner, Vilkas, Buck. 1981.
Adequate to support full registration. Same rationale as for Bluegill sunfish.

Channel Catfish LC_{50} > 91.6 mg/l
Schupner, Vilkas, Buck. 1981.
Not adequate to support full registration.
Adequate to support the end-use product Larvadex 0.3% Premix, for fly control around poultry. This study, although it had no mortality at up to 91.6 mg/l did not calculate on LC_{50}, and deviated from preferred protocol by the following points:
- loading > 0.88 g/l
- fish weights > 1.25 g each
- aeration during the study
- not a preferred indicator species

This study is scientifically sound and may be used for hazard assessment for end-use products made with technical cyromazine when max EEC's are demonstrated to be <100 mg/l (aquatic)

Freshwater Aquatic Invertebrate (48-hr) LC50

Daphnia magna LC_{50} >97.8 mg/l
Hughes, Vilkas & Buck. 1981.
Not Adequate to support full registration - no raw data for controls were reported.
Adequate to support Larvadex 0.3% Premix-fly control.
Adequate to support end-use products made from Cyromazine technical when max EEC's (aquatic) are demonstrated to be <100 mg/l.

104.5 Additional Data Required

Provide the raw mortality data for the controls on the Daphnia magna 48-hr LC_{50} study by Hughes, Vilkas, & Buck. 1981. (Acc. #070912).

Additional Tier I LC_{50} data for aquatic invertebrate, warmwater & coldwater fish species may be required in the future, if proposed use patterns of end-use products result in aquatic EEC's of >100 mg/l, because the LC_{50}'s were not calculated in the submitted testing under Acc. # 070912 for Bluegill sunfish, Rainbow trout, and Daphnia magna.

107 Conclusions

107.1 Environmental Fate and Toxicology Acknowledgement

EEB has not examined reviews by the Environmental Fate Branch or the Toxicology Branch/HED during the course of our review, because these were not available in a timely manner (i.e. in order to complete EEB's review of Cyromazine on deadline, by 9/30/82).

107.3 Environmental Hazards Labeling

Adequate for proposed use pattern (fly control around poultry).

107.4 Data Adequacy Conclusions

Data submitted under Acc # 070912

Mallard LD_{50}	Adequate to support full registration
Bobwhite quail LD_{50}	" " " " "
Mallard LC_{50}	" " " " "
Bobwhite quail LC_{50}	" " " " "

Peking Duck LD_{50} - Inadequate study. Minimal data reported. Minimal quality. No controls used.

Bluegill Sunfish 96-hr LC_{50} - adequate for full registration

Rainbow Trout 96-hr LC_{50} - " " " "

Channel Catfish 96-hr LC_{50} - Inadequate study; does not support full registration. Adequate to support end-use products and hazard assessments with use patterns where aquatic EEC < 100 mg/l.

Daphnia magna LC_{50} - Inadequate to support full registration (no raw data for controls reported). Adequate to support end-use products with aquatic EEC < 100 mg/l.

107.5 Data Requests

Requested Data

- provide raw mortality data for controls on the Daphnia magna study

107.6 Special Notes

Additional Tier I data (i.e. aquatic invertebrate and fish LC_{50}) may be required to support use patterns where aquatic EEC > 100 mg/l

107.7 Recommendations

EEB has completed a full risk assessment 3 (c) (5) finding of the proposed registration of Cyromazine technical, and of Larvadex 0.3% Premix for fly control around poultry. Based upon the available data and use information, EEB concludes that the proposals provide for minimal hazards to nontarget organisms (subject to validation of environmental chemistry and toxicology information discussed herein).

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