Fonofos
7/15/82

DATA EVALUATION RECORDS

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103542 GUIDELINE 40 CFR 163.71-5

FORMULATION 12 - EMULSIFIABLE CONCENTRATE (EC OR E)

FICHE/MASTER ID 00090849 CONTENT CAT 01

Midwest Research Farms (1974) Exposure of Pheasants to Grain Sorghum Treated with Dyfonate. (Unpublished study received Dec 9, 1974 under 476-2134; submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 132056-A)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE Nov 1 END DATE Nov 1, 1982

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769
LOC/TEL: 703-557-7695
SIGNATURE: Rich Balcomb DATE: Nov 1 1982

APPROVED BY:
TITLE:
ORG:
LOC/TEL:
SIGNATURE: DATE:

Conclusions: The exposure of caged 8-week old ring-necked pheasants to two 1 lb a.i./A of Dyfonate 4E resulted in no discernible pesticide effects. The study is considered scientifically sound and indicates that fonofos, under the conditions of the test, did not cause acute poisoning of adult pheasant.

DER

Chemical: Fonofos

Formulation: Dyfonate 4E

Midwest Research Farms. (1974). Exposure of Pheasants to Grain Sorghum treated Dyfonate. FIche/Master ID 90849

Reviewer: Richard Balcomb
Date: Oct 29, 1982

Study type: Stimulated Field Study

Methods: Eight week old ring-necked pheasants were penned over sorghum (boot stage). Cages were 5 x 8 ft and 4 ft high. Four birds were in each cage and six cages were placed in treated and control locations (separated by buffer strip). Birds were acclimated to cages for 1 day prior to treatment.

Dyfonate 4E was applied twice at the rate of 1 lb a.i./A by ground rig. In 3 of the six treatment cages water and food were removed before spray, in the remaining 3 food and water were open to direct spray. At the time of the second spray all food and water were left in cages. Food was scattered on the ground between rows.

The test was terminated 48 hr after the second treatment.

Results: Mortality Data (1 bird died in treated and control regimes)

July	25	(+ 8 days) -	treatment bird (1/24)
July	29	(+ 11 days) -	control bird (1/24)

Behavioral Data

No toxic symptoms were observed throughout the study. Birds appeared normal througout the study and were observed feeding on the scattered grain and sorghum leaves.

Validation Category: Supplemental

Rationale: The study was conducted in a scientifically sound manner and, in general, follows recommended EPA procedures. However, the submitted study is in the form of an informal 3 page report; it does not describe methodology or observations in fine detail. However, the basic test set-up and results are considered adequately described such that the information can be used in a hazard assessment.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103542 GUIDELINE 40 CFR 163.71-5

FORMULATION 04 - GRANULAR

FICHE/MASTER ID 00090882 CONTENT CAT 01

Fink, R.; Grimes, J. (1978) Final Report: 30-day Simulated Field Study in Corn with Bobwhite Quail Utilizing Dyfonate 10-G and 20-G. (Unpublished study, including letter dated Jan 17, 1979 from W.R. Hillebrecht to Marilyn Mautz and submitter summary, received Jan 26, 1979 under 476-1995; prepared by Wildlife International Ltd., submitted by Stauffer Chemical Co., Richmond, Calif. CDL:238144-A)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE Nov 16 END DATE Nov 16, 1982

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LOC/TEL:
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Conclusions: The 30-day simulated field study, testing the effects of 10G and 20G formulations of dyfonate on adult bobwhite, reports that no pesticide mortalities or related effects occurred. The study is considered scientifically sound and may be used in a hazard assessment. As the number of test birds per treatment is small, the statistical power of the test is low, and no-effect conclusions must be guardedly accepted.

VALIDATION

Reviewer: Richard Balcomb

Date: March 12, 1979

1. Citation: Fink, Robert and Jennie Grimes. 30-Day Simulated Field Study in Corn With Bobwhite Quail Utilizing Dyfonate 10-G and 20-G. November 8, 1978. Wildlife International LTD.

2. Test Type: ES-EE, (Avian Large Pen Field Study)

3. Test Compound: Dyfonate 10-G and Dyfonate 20-G (Stauffer Chemical Company).

4. Validation Category: Supplemental

5. Test Organism: One year old Bobwhite

6. Methods & Results: Twelve adult Bobwhite (6 males, 6 females) were introduced into each of three pens (50' X 100') on July 7, 1978. On July 11, 1978, one pen was treated with Dyfonate 10-G (40 lbs./A) aerially and another was treated with Dyfonate 20-G (8 lbs./A) as a band application. The third pen was used as a control.

Mortality

On test Day 0, the day of the pesticide applications, two males were observed fighting. One male was left prostrate after the encounter and later it appeared stunned. On Day 1, this male was found dead.

On Day 4, a female was found dead in the Dyfonate 20-G plot. It was reported that this female had fluffed feathers and wing droop on Day 0 and was slow to respond to external stimuli.

The researcher concluded that neither of these deaths was pesticide related:

"Two mortalities occured, a male on Day 1 in the 10-G plot and a female on Day 4 in the 20-G plot. Death in the male was attributed to injuries sustained during agressive fighting. Death in the female was not considered compound related since no symptoms of cholinesterase inhibition were observed in the female prior to death."

Sublethal Effects

The researchers report that all birds were individually tagged with a visible marker and that all birds were observed and evaluated daily on the basis of a "Sublethal Effects Index" scoring system. Observational parameters comprising the sublethal effects index were activity, reaction to external stimuli, feather condition, locomotion and wing droop.

The researchers concluded that no abnormal behavior or symptoms of toxicity were observed.

Conclusions

The following final conclusions were drawn by the researcher:

Based on the Results of this study, Dyfonate 10-G and 20-G does not appear to represent an acute hazard to birds when used at the rates tested.

7. Reviewer Comments

The following mortality pattern was reported:

	Control	Dyfonate 10-G	Dyfonate 20-G
Survivor Ratio	12/12	11/12	11/12
Percent Mortality	0%	8.3%	8.3%

As described in Section 6 above, the researcher has provided a rationale for considering the mortalities not to be pesticide related. This reviewer contends that, based on the data submitted, the converse hypothesis is equally probable, i.e., that the reported mortality may be the result of pesticide intoxication.

The female bobwhite that died showed fluffed feathers, wing droop and reduced reaction to external stimuli on the day of pesticide application. These symptoms are not inconsistent with a pesticide intoxication hypothesis.

The male Bobwhite mortality, following one day after a fight in which this bird was involved, has not been convincingly established as the result of the fight.

Intraspecific rivalry rarely results in mortality, but though this must be considered a possibility here we must also allow the possibility that the pesticide variable played a supporting or even determining role in this death. It is interesting that the gross necropsy performed on this bird revealed no abnormalities. Are we to believe a blow to the head severe enough to result in death within 24 hours produced no hemorrhage or other visible injury?

Conclusions

The reviewer concludes that two birds exposed to the pesticide died and that no mortalities occurred in the control group. Insufficient data are available to establish casual factors in these mortalities but pesticide effects can not be ruled out.

Dyfonate did not result in extensive mortality or other readily apparent signs of poisoning to exposed birds.

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CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103542 GUIDELINE 40 CFR 163.71-5

FORMULATION 04 - GRANULAR

FICHE/MASTER ID 00090862 CONTENT CAT 01

Piccirillo, J.J.; Truslow, J.U. (1977) Final Report: 14-day Simulated Field Trial in Bobwhite Quail with Dyfonate 10 G and Dyfonate 20 G: Project No. 132-148. (Unpublished study, including submitter summary, received Dec 13, 1977 under 476-1995; prepared by Hazleton Laboratories America, Inc., submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 232469-C)

SUBST. Class = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE:

Conclusion: The study is scientifically sound but should only be used as supplemental information in conducting a hazard assessment. This simulated field study demonstrated that granular formulations of fonofos did not significantly affect exposed bobwhite. Study deficiencies included the small number of test birds, control mortality, questionably appropriate substrate (turf) (corn is the only major use), and failure to move the small pens during the test period.

Reviewer: Richard Balcomb

Date: Nov 16, 1982

Chemical: Dyfonate (Fonofos)

Formulation: Granular (10% & 20%)

Test type: Simulated Field Study - Bobwhite

Shaun. No.: 41701

Fiche/Master ID 90862

Title:

Piccirillo, V.J.; Truslow, J.U. (1977) Final Report: 14-day Simulated Field Trial in Bobwhite Quail with Dyfonate 10 G and Dyfonate 20 G: Project No. 132-148. (Unpublished study, including submitter summary, received Dec 13, 1977 under 476-1995; prepared by Hazleton Laboratories America, Inc., submitted by Stauffer Chemical., CDL:232469-C)

Methods: (largely quoted or paraphased from the report)

Fifty-six healthy bobwhite quail (28 males and 28 females) were randomly distributed in pairs (one male and one female) into the following groups:

Group	No. of Birds	Treatment
I	6 M, 6 F	Control
II	6 M, 6 F	Dyfonate 10 G (40 lbs/acre)
III	6 M, 6 F	Dyfonate 20 G (10 lbs/acre)
IV	10 M, 10 F	Replacement birds

The birds were not debeaked.

Birds were acclimated for 14 days in outdoor pens in the area in which the study was conducted. Pens were approximately 20 square feet (4 ft x 5 ft x at least 1 ft. inside measurement), and consisted of at least a 2 inch x 2 inch wooden frame covered with 1/2 inch mash hardware cloth. Each pen contained a poultry waterer and a small open box which served as shelter for the birds. The boxes were 12 x 12 x 14 inches. Each box also had a 4-inch bottom cross panel and a 6-inch top cross panel made of plywood that contained straw to serve as extra shelter for the birds. One inch by two inch welded wire was fastened to the bottom of each box to allow unrestricted feeding and to prevent predation and injury to the birds upon moving.

The study was conducted at the Truslow Farms, Incorporated in Chestertown, Maryland on a test plot of approximately 16,5000 sq. ft. The Warren A-34 Blue Grass Sod in this plot was limed at a rate of 2000 pounds per acre during the week of March 7 and fertilized the same week with 10-10-10 at a rate of 400 pounds per acre.

The sod was mowed on April 7 and April 20 and the cuttings were raked and removed from the test site. The pens were removed during moving and replaced in position after raking. The test plots are shown in Figure 1: Area 1 was the test plot for Dyfonate 10 G; Area 2 was the test plot for Dyfonate 20 G; while Area 3 was the control plot. The replacement birds were held in two extra pens in Area 4. During the 14-day acclimation period, any bird appearing unhealthy or dying was replaced from flight pens containing reserve birds.

A commerical Jackson 32-26 with a 36-inch trough was utilized for the application of Dyfonate 10 G and Dyfonate 20 G. Calibration of the Jackson 36-26 was done on test strips 3 feet wide and 300 feet long. A setting of 2 1/2 on the test strip gave 40 pounds per acre. On April 20, after mowing and raking the sod, the test plots were treated. During the treatment of test Area 1 the Dyfonate 10 G seemed to clog in the spreader. After the first pass with the spreader over the area, only 750 grams had been applied of the total 2214 grams required for the area. A second pass at right angles to the first pass applied another 750 grams. A third pass parallel to the first pass applied a final 750 grams. The total rate of application for this area was 40.59 pounds/acre.

In Area 2, the spreader wa set at 2, the lowest setting possible. for the application of Dyfonate 20 G. On the first pass over the area, 225 grams of the total required 373 grams was applied. A second pass over the area at right angles to the first pass applied 275 grams. The calculated application for this area was 13.93 pounds per acre.

After application, six pens of birds, each containing 1 male and 1 female, were placed in each of the treated areas; six pens of birds were also placed in Area 3 on the untreated grass. The 10 male and 10 female replacement birds were placed in Area 4. Water and 3 ounces of pigeon grains were scattered in one-half of the pens in each area. The remaining one-half of the birds did not receive any food or water until 12 hours postapplication of the compounds. After 12 hours postapplication, food and water available to all birds ad libitum. The pens were not moved during the study.

For each bird, individual body weights were recorded initially (at start of the exposure phase) and at termination or death. All of the birds were observed daily for mortality or signs of toxicity. If a death occurred in a pen, the surviving bird was removed and place in an individual holding pen and a fresh pair of birds from the replacement group was placed in the pen. The removed survivors were observed until termination of the study. The study was terminated after all of the replacement birds had been exposed for 14 days. Exposure time for the non-replaced birds was 19 days. At termination (Day 19), all surviving control and test birds were sacrificed. Necropsies were performed on all birds that died during the study and those sacrificed at termination.

The study was initiated on April 7, 1977, and terminated on May 10, 1977.

Results: The researchers report no mortalities or other effects attributable to the pesticide.

The following deaths were reported:

Mortality	Treatment Group
2 female, 1 male	Control
1 female, 1 male	20 - G
No deaths	10 - G

Validation Category: Supplemental

Category Rationale: The study is considered scientifically sound and may be used in hazard assessment. However, the small number of birds tested per treatment level makes the study very weak statistically, i.e. only a very high incidence of effects could be detected. In my opinion the most that can be conclude is that extensive mortality did not occur among exposed birds (this is an example where brain AChE monitoring would have aided diagnostic comparisons between the ~17% mortality in the 20 - G group and the ~17% mortality [of the original 12] in the controls). It should also be noted that the small pens were not moved during the test period as suggested by EPA guidelines.

Use of this information in a hazard assessment will be limited by the fact that it was conducted on turf for which no registration currently exists.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103542 GUIDELINE 40 CFR 163.71-5

FORMULATION 04 - GRANULAR

FICHE/MASTER ID 00048825 CONTENT CAT 01

Piccirillo, V.J.; (1977) Final Report: 14-Day Simulated Field Trial in Bobwhite Quail with Dyfonate 10 G and Dyfonate 20 G: Project No. 132-148. (Unpublished study, recieved Jun 27, 1977 under 476-1995; prepared by Hazleton Laboratories America, Inc., submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 230754-A)

SUBST. Class = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

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SIGNATURE: DATE: 11-18-82

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SIGNATURE: DATE:

Conclusions: This study is the same as that contained in fiche ID 90862 which has already been reviewed.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00090820 CONTENT CAT 01

Beliles, R.P.; Wright, L.S.; Knott, W. (1966) N=2790: Safety Evaluation on Fish and Wildlife (Bobwhite Quail, Rainbow Trout and Bluegill Sunfish). (Unpublished study received Dec 12, 1966 under 7F0548; prepared by Woodard Research Corp., submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 090678-V)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: EEB -40-05054543

DIRECT RVW TIME = (MH) START-DATE 18 Nov END DATE 19 Nov

REVIEWED BY: Richard Balcomb
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Conclusions: This report contained acute toxicity results for birds and fish. Bobwhite dietary LC_{50} results indicate that fonofos is moderately toxic, this portion of the study is considered supplemental information as the tested birds were not chicks (10-17 days) as required. The bluegill and rainbow trout LC_{50} tests run with technical fonofos are scientifically sound and fulfill guideline requirements for acute fish toxicity testing. These results demonstrate that fonofos is highly toxic to freshwater fish. The bluegill and rainbow trout tests run with the 10% granular formulation are considered supplemental information; no EPA approved protocols exist for granular formulations.

Reviewer: Richard Balcomb
Date: 18 Nov 1982
Chemical: Fonofos (Dyfonate)
Formulations: (1) Tech >99% a.i. (N-2790, assumed to be fonofos)
(2) Granular formulation, 10% a.i., (N-2790)

Citation: Beliles, R.P., L.S. Wright, W. Knott. 1966. N-2790: Safety Evaluation on fish and wildlife (Bobwhite Quail, Rainbow Trout and BLuegill Sunfish). Woodard Research Corp. for Stauffer Chem. Co., Richmond, Cal. Fiche/Master ID 90820

Test type:

Bobwhite LC_{50}	Tech and Formulation
Bluegill LC_{50}	" "
Rainbow trout LC_{50}	" "

Methodology:

A. Bobwhite

Bobwhite, 6-8 weeks of age, were acclimated to the test facility for 10 days then randomly distributed to thest groups. Ten birds were tested at each concentration. The technical liquid and the 10% dry granular material were mixed into the laboratory quail diet. Birds were exposed to treated diets for 7 days then returned to basal diet. Water and diets were available ad libitum.

B. Fish

- Rainbow trout (Salmo gairdneri), mean weight 1 gram and mean length 4 cm, were acclimated to the facility for 20 days. Fish were randomly assigned to test concentrations and held for 48 hr without food. Test vessels were glass jars containing 15 L water. Fresh solutions were prepared on the first day of the study. The technical material was first dissolved in propylene glycol, the granules were added directly to the aquaria. Water temperature was 62-65°F.

- Bluegill sunfish (Lepomis macrochirus) were collected near the test facility and acclimated for 10 days. Mean length and weight were reported as approximately 3 g and 2 cm respectively (N=15). Five fish were held in each glass jar (15L) and 2 jars were used per concentration. Water temperature was 76-78°F.

Results:

Species	Toxicant Form	LC50	Exposure Duration
Bobwhite	Tech	400 ppm	7 days
Bobwhite	10% G	16,500 ppm	7 days
Bluegill	Tech	29 ppb	96-h
Bluegill	10% G	320 ppb	96-h
Rainbow	Tech	50 ppb	96-h
Rainbow	10% G	2800 ppb	96-h

See attached data tables for mortality details.

Validation Category:

(A) Bobwhite results are considered scientifically sound but are rated supplemental as: (1) birds were 6-8 weeks old not 10-17 days (2) exposure duration was 7 days not 5 days (3) mixing granules in the diet is not a recommended practice. The data demonstrate that fonofos is moderately toxic to adult bobwhite.

(B) Bluegill and rainbow trout LC_{50} studies with technical material are rated core and are considered scientifically sound. The formulation (10G) tests for these species are considered supplemental information. Testing for formulations is generally required only when products may be applied directly to water or wetlands; fonofos is not labelled for such uses.

Bobwhite Data

Material	Level (ppm in diet)	Mortality (Days) 1	2	3	4	5	6	7	8	9	10	Total Mortality
Control	-											0/20
N-2790 (Tech)	3,200	3	1		5	1						10/10
N-2790 (Tech)	1,800				1	2	3	1	1			8/10
N-2790 (Tech)	1,000			1	3	3	3					10/10
N-2790 (Tech)	560					2	5	1	1			9/10
N-2790 (Tech)	320					2		2	3			7/10
N-2790 (Tech)	180								1		1	2/10
N-2790 (Tech)	100											0/10
N-2790 (Tech)	55											0/10
N-2790 (10%)	32,000				1	5	3	1				10/10
N-2790 (10%)	10,000				1		2	3				6/10
N-2790 (10%)	10,000						1					1/10
N-2790 (10%)	5,600											0/10

Material	LC_{50} ppm in diet	Confidence Limits ppm in diet
n-2790 (Tech)	400[1]	258-620
N-2790 (10%)	16,500[2]	11,870-22,935

The following table summarizes the effects of body weight and food consumption.

Level ppm	Mean Body Weight(g) Day 0	Day 7	Day 10	Mean Food Consumption g/bird/day Day 1-7	Toxicant Intake mg/kg Day	mg/bird/ day
Control	155	161	165	13.6	0	0
Control	122	143	149	17.2	0	0
N-2790 (Tech)						
3,200	140	-	-	-	-	-
1,000	165	130	135	-	-	-
1,000	155	-	-	-	-	-
560	142	95	101	6.2	24.4	3.47
320	135	87	110	6.1	14.4	1.95
180	152	114	129	10.9	12.9	1.96
100	145	137	155	14.3	9.9	1.43
56	157	169	181	14.9	5.3	0.83
N-2790 (10%)						
32,000	136					
18,000	151	118	132	5.2	619.8	93.6
10,000	165	106	130	6.2	375.7	62.0
5,600	167	127	132	6.9	231.1	35.6

(continuation)

*Based on iniital weight correct for deaths and expressed in terms of toxicant tested formulation or technical.

[1]EEB Moving Average Calculation: LC_{50}=322 (213.6-459) ppm
EEB Probit calculation: LC_{50} = 316 (80.4-1077.39)
Slope = 2.65 P> Chi^2 = 0.003 (N.S.)
LC_{10} = 104.9 (.44 - 231.9)

[2] EEB Probit Calculation: LC_{50} = 15,518 (12447-20083), p> Chi^2 = 0.84
Slope = 706
LC_{10} = 10,490 (5751-13162)

Bluegill Sunfish Data

Material	Concentration ppm	Cumulative Mortality 24 hrs	48 hrs	72 hrs	96 hrs
Control		0/10	0/10	0/10	0/10
Control propylene glycol	(0.5 ppt)	0/10	0/10	0/10	0/10
N-2790 (Tech)	0.56	10/10	10/10	10/10	10/10
N-2790 (Tech)	0.32	10/10	10/10	10/10	10/10
N-2790 (Tech)	0.18	10/10	10/10	10/10	10/10
N-2790 (Tech)	0.10	10/10	10/10	10/10	10/10
N-2790 (Tech)	0.074	9/10	10/10	10/10	10/10
N-2790 (Tech)	0.056	1/10	2/10	5/10	7/10
N-2790 (Tech)	0.032	1/10	3/10	4/10	6/10
N-2790 (Tech)	0.018	0/10	0/10	0/10	0/10
N-2790 (10%)	5.6	10/10	10/10	10/10	10/10
N-2790 (10%)	3.2	10/10	10/10	10/10	10/10
N-2790 (10%)	1.6	6/10	8/10	8/10	9/10
N-2790 (10%)	1.0	2/10	6/10	8/10	8/10
N-2790 (10%)	0.50	0/10	3/10	4/10	6/10
N-2790 (10%)	0.32	0/10	0/10	2/10	5/10
N-2790 (10%)	0.18	0/10	0/10	1/10	1/10

These data, when examined by the method of Litchfield and Wilcoxon (1949), yielded results in terms of LC_{50} values and 95 per cent confidence limits as follows:

Duration Hours	LC50 (95% Confidence Limits) in ppm	
	N-2790 (Tech)	N-2790 (10%)
24	0.065(0.059-0.070)	1.6(1.1-2.2)
48	-	0.86(.59-1.25)
96	0.029(0.27-0.051)[1]	0.32(.18-0.56)[2]

[1] EEB Probit Calculation: LC_{50} = 0.035 (.027-.044)
Slope = 5.4 P> Chi^2 = 0.57)
LC_{10} = 0.021 (.011-.27)

[2] EEB Probit Calculation: LC_{50} = .43 (.27 - .61)
Slope = 2.56 p>Chi^2 = .93
LC_{10} = 0.138 (.043-.23)

Rainbow Trout Data

Material	Concentration ppm	Cumulative Mortality 24 hrs	48 hrs	72 hrs	96 hrs
Control		0/10	0/10	0/10	0/10
Control propylene glycol	(U.S. ppt)	0/10	0/10	1/10	1/10
N-2790 (Tech)	0.32	10/10	10/10	10/10	10/10
N-2790 (Tech)	0.24	8/10	10/10	10/10	10/10
N-2790 (Tech)	0.18	2/10	7/10	9/10	9/10
N-2790 (Tech)	0.10	0/10	3/10	3/10	7/10
N-2790 (Tech)	0.056	0/10	1/10	1/10	5/10
N-2790 (Tech)	0.032	0/10	0/10	5/10	5/10
N-2790 (Tech)	0.018	0/10	0/10	0/10	0/10
N-2790 (10%)	10.0	2/10	5/10	10/10	10/10
N-2790 (10%)	5.6	1/10	3/10	8/10	10/10
N-2790 (10%)	3.2	0/10	0/10	1/10	6/10
N-2790 (10%)	1.8	0/10	0/10	0/10	2/10
N-2790 (10%)	1.0	0/10	0/10	0/10	0/10

These data, when examined by the metod of Litchfield and Wilcoxon (1949), yielded results in terms of LC_{50} alues and 95 per cent confidence limits as follows:

Duration hours	LC50 (95% Confidence Limits) in ppm N-2790 (Tech)	N-2790 (10%)
24	0.215(0.183-0.251)	15.5(9.3-25.5)
48	0.125(0.090-0.173)	10.0(6.17-16.2)
96	0.050(0.032-0.079)[1]	2.8(2.0-3.8)[2]

[1] EEB Probit Calculation: LC_{50} = 0.052 (.035 - .072)
slope = 2.81 $p > Chi^2$ = .45
LC_{10} = 0.018 (.0076 - .0285)

[2] EEB Probit Calculation = LC_{50} = 2.67 (2.1 - 3.4)
Slope = 6.05 $p>Chi^2$ = .84
LC_{10} = 1.65 (.90 - 2.1

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00022923 CONTENT CAT 02

Hill, E.F.; Heath, R.G.; Spann, J.W.; et al. (1975) Lethal Dietary Toxicities of Environmental Pollutants to Birds: Special Scientific Report-- Wildlife No. 191. (U.S. Dept. of the Interior, Fish and Wildlife Service, Patuxent Wildlife Research Center; unpublished report)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 19 Nov END DATE 19 Nov

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-19-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: The study is considered scientifically sound and fulfills the requirements for avian dietary toxicity testing for waterfowl and upland gamebirds. The study demonstrates that Dyfonate is highly toxic to Bobwhite, Japanese quail and Ring-necked pheasant, but moderately toxic to Mallards.

Reviewer: Richard Balcomb
Date: 19 Nov 1982
Chemical: Fonofos
Form: 93% Tech

Citation: Hill, E.F., R.G. Heath, J.W. Spann. 1975. Lethal Dietary Toxicities of Environmental Pollutants to Birds.
SSR - 191. USDI.
Fiche/Master ID 22923

Test Type: Avian dietary LC_{50}

Methodology: Meets or exceeds EPA guidelines.

Results:

CHEMICALS

Species	No. concen-trations	(Birds per conc.)	LC_{50}: ppm chem. in feed	(95% conf. limits)	Slope: probit on log (St. conc. dev.)
Bobwhite	5	(6)	133	(105- 195)	4.166 (2.764)
Jap. quail	6	(10)	295	(259- 336)	6.841 (1.476)
Pheasant	6	(10)	270	(239-306)	8.94 (3.11)
Mallard	5	(10)	1225	(889-1773)	3.399 (1.082)

Validation Category: Core

Validation Rationale: The study was performed by the U.S. Fish and Wildlife Service at Patuxent Wildlife Research Center. EEB has previously validated their testing procedures (R. Stevens, Temephos Registration Standard).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00074646 CONTENT CAT 12

Anon. (19??) Without title . N.P. (Pages 27-57; available from: Superintendent of Dcuments, U.S. Government Printing Office, Washington, D.C; published study; CDL: 050544-A)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 19 Nov END DATE 19 Nov

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-19-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: These data were reviewed previously - see Fiche Master ID 022923.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05050542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00092027 CONTENT CAT 12

U.S. Fish and Wildlife Service (1968) Bird Toxicity or Stupefacient Test Results. (Denver Wildlife Research Center, Chemical Development Project, Section of Bird Damage Control; unpublished study; CDL: 241307-H)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE Nov 23 END DATE Nov 23

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-23-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: The study is essentially a range-finding test for 2 songbird species. The results suggest that dyfonate is highly toxic to red-winged blackbirds and starlings. The study partially fulfills avian acute toxicity testing requirements. The information is pertinent and can be used in a hazard assessment.

Reviewer: Richard Balcomb
Date: Nov 23, 1982
Chemical: Dyfonate
Citation: Schafer, Edward. Unpublished. Bird Toxicity or Stupefacient Results. U.S. Fish and Wildlife Service. Denver Wildlife Research Center.

Fiche/Master ID: 92027

Methodology: Starlings and Red-winged blackbirds were orally dosed with Dyfonate dissolved in propylene glycol. Two birds were dosed per treatment level. Toxicant is assumed to be technical material (pers. commun. E. Schafer).

Results: Starling LD_{50} = 42 mg/kg
Red-winged Blackbirds LD_{50} = 10 mg/kg

(See attached summaries for mortality details)

Validation Category: Supplemental

Category Rationale: The studies were essentially range-finding tests. Too few birds were used to produce a precise LD_{50} estimate.

BIRD TOXICITY OR ... FACIENT TEST RESULTS

Denver ... dlife Research Center

Chemical: DRC-4215, Dyfonate, N 2790 O-Ethyl-S-phenyl-ethyl phosphonodithioate

1719

Species: Red-winged Blackbird Route: Oral - stomach tubed Carrier: Propylene glycol

Dosage Mg/kg	Immobilization			Mortality	Time of Death	Emesis		3 -Day Weight Gain (+) or Loss (-) g	REMARKS
	No./No. Tested	Induction (Min.)	Duration (Min.)			No./No. Tested	Time (Min.)		
100	2/2	15, 20	-	2/2	(Min.) 24, 35	1/2	15	-	
18	2/2	30, 31	-	2/2	(Min.) 72, 73	0/2	-	-	
10	1/2	48	-	1/2	138 Min.	0/2	-	-3	
5.6	0/2	-	-	0/2	-	0/2	-	-6, -8	

Acute LD_{50} 10 mg/kg. 95% C.L. 5.6-18 mg/kg

Acute ED_{50} _____ 95% C.L. _____

☒ Does not warrant further testing due to low bird-activity

☐ Does not warrant further testing at present but may be reconsidered later for possible future applications

☐ Shows sufficient activity or specificity to warrant further testing as: ☐ Toxicant ☐ Stupefacient

*Method of Thompson and Weil (Biometrics (8) pp. 51-54, 1952)

Investigators: Don Cunningham, Ed Schafer

Date: February 1968

BIRD TOXICITY OR STUPEFACIENT TEST RESULTS

Denver Wildlife Research Center

Chemical: DRC-4215, Dyfonate, N 2790 O-Ethyl-S-phenyl-ethyl phosphonodithioate

Species: Starling Route: Oral - stomach tubed Carrier: Propylene glycol

Dosage Mg/kg	Immobilization No./No. Tested	Induction (Min.)	Duration (Min.)	Mortality	Time of Death	Emesis No./No. Tested	Time (Min.)	3-Day Weight Gain (+) or Loss (-) (g)	REMARKS
100	2/2	12, 16	-	2/2	17, 23 Min.	1/2	13	-	
56	2/2	19, 40	-	2/2	49,93 "	0/2	-	-	
32	0/2	-	-	0/2	-	0/2	-	-3, -5	

BEST DOCUMENT AVAILABLE

Acute LD_{50} 42 mg/kg* 95% C.L. Not calculable*

Acute ED_{50} ______* 95% C.L. ______*

- [X] Does not warrant further testing due to low bird activity
- [ ] Does not warrant further testing at present but may be reconsidered later for possible future applications
- [ ] Shows sufficient activity or specificity to warrant further testing as: [ ] Toxicant [ ] Stupefacient

*Method of Thompson and Weil (Biometrics (8) pp. 51-54, 1952)

Investigators: Don Cunningham, Ed Schafe

Date: February 1968

Page 1 of 2

1718

0105-032-13
241307-2-13

63

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05050542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00090861 CONTENT CAT 01

Piccirillo, V.J. (1977) Final Report: Acute Oral LD_{50} - Study in Mallard Ducks: Project No. 132-149. (Unpublished study recieved Dec 13, 1977 under 476-1995; prepared by Hazleton Laboratories America, Inc., submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 23332469-A)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE Nov 24 END DATE Nov 24

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
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SIGNATURE: DATE: 11-24-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: The study is scientifically sound and indicates that dyfonate is moderately toxic to mallards (LD_{50} = 128 mg/kg). The study fulfills the requirement for an acute oral toxicity study on waterfowl.

Reviewer: Richard Balcomb
Date: 23 Nov 1982
Chemical: Dyfonate Technical (93.5%)

Citation: Piccirillo, V.J. 1977. Final Report: Acute Oral LD_{50} Study in Mallard Ducks: Project No. 132-149. Hazleton Laboratories America, Inc.

Fiche: 090861

Methods:

Eight groups of five male and five female Mallards (Anas platyrhynchos) of at least sixteen weeks of age were selected for this study at Truslow Farms Ic., Chestertown, Maryland. Birds were acclimated for fourteen days. The animals were housed in pens by treatment level and sex in a buildling in which artificial light was provided for twelve hours per day. The air temperature was controlled only to the extent needed to prevent freezing of water lines and water troughs. Food and water were available ad libitum during the study.

The animals were weighed and fasted overnight prior to treatment. The initial body weights ranged from 1065 to 1570 grams for the males and from 930 to 1265 grams for the females. Terminal body weights were recorded for each animal.

The test material was prepared as a solution in corn oil and administered by oral intubation to seven groups of ducks at dosage levels of 2, 4, 8, 16, 32, 128, and 512 mg/kg of body weight. All of the dosing solutions were adjusted so that all dosing volumes were approximately ten ml/kg of body weight. An eighth group of ducks received an equal volume of the diluent alone and served as a control. All of the ducks were observed for mortality and signs of toxic and pharmacologic effects immediately after dosing, at one and four hours postdosing, and once daily thereafter for a total of fourteen days. Necropsies were performed on all animals which died during the study and on all animals sacrificed at termination (Day 14). Mortality data were analyzed statistically by the method of Litchfield and Wilcoxon, J. Pharmacol. and Exptl. Therap. 96, 99, 1949.

Results: LD_{50} = 128 mg/kg
95% C.L. = 78 - 211

[As one partial mortality occurred results could not be re-analyzed by Probit analysis. EEB analysis by the binomial method indicated results similar to those reported:

LD_{50} = 128 mg/kg (32 - 512)]

See attached mortality table.

Validation Category: Core

Category Rationale: The study is considered scientifically sound and the results indicate that technical dyfonate is moderately toxic to mallards. These data fulfill the requirement for an acute oral LD_{50} test on waterfowl.

Table 1
Cumulative Mortality[a]
Acute Oral LD_{50} Study of Dyfonate Technical in Mallard Ducks

Dose Level mg/kg	Time After Dosing					
	Immediately	Hour			Day	
		1	4	24	2	3-14
0	0	0	0	0	0	0
2	0	0	0	0	0	0
4	0	0	0	0	0	0
8	0	0	0	0	0	0
16	0	0	0	0	0	0
32	0	0	0	0	0	0
128	0	0	5	5	5	5
512	0	5	9	10	10	10

[a] Number of dead out of 10 ducks/levels.

LD_{50} = 128 mg/kg of body weight with 95% confidence limits from 78 to 211 mg/kg.

EEB Binomial Calculation: LD_{50} = 128 mg/kg (32 - 512)

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05050542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00020560 CONTENT CAT 02

Schafer, E.W. (1972) The acute oral toxicity of 369 pesticidal, pharmaceutical and other chemicals to wild birds. Toxicology and Applied Pharmacology 21(?):315-330. (Also In unpublished submission received Apr 25, 1978 under 476-2180; submitted by Stauffer Chemical Co., Richmond, Calif.; CDL:233577-C)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: TOX -40-05050521

DIRECT RVW TIME = (MH) START-DATE Nov 24 END DATE Nov 24

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-24-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: These data were validated previously - see Fiche/Master ID 92027, E. Schafer, Bird Toxicity of Stupefacient Results, USDI, Fish and Wildlife Service.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103043

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00052064 CONTENT CAT 01

Sleight, B.H., III (1972) Acute Toxicity of Dyfonate to Bluegill (Lepomis macrochirus). (Unpublished study received Apr 2, 1973 under 3F1370; prepared by Bionomics, Inc., submitted by Stauffer Chemical Co., Richmond, Calif. CDL:)93686-H)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: TOX -40-05050521

DIRECT RVW TIME = (MH) START-DATE Nov 26 END DATE Nov 26

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: The study is scientifically sound and demonstrates that dyfonate is highly toxic to bluegill sunfish. The study fulfills the requirement for a warmwater fish 96-h LC_{50}.

Reviewer: Richard Balcomb
Date: 24 Nov 1982

Chemical: Dyfonate Tech (94.4% a.i.)

Citation: Sleight, B.H. III. L972. Acute Toxicity of Dyfonate to Bluegill (Lepomis macrochirus). Bionomics Inc.

Fiche/Master ID: 52064

Validation Category: core

Test Type: Bluegill 96-h LC_{50}

Result: 96-h LC_{50} = 28 ppb
95% C.L. = 15 - 53

Methods: (Quoted From report)

Test procedures for the dynamic bioassay are those described for fish Bioassay Procedures in the 1970 edition of Standard Methods (APHA). The bluegill used in these test were acquired from a commercial fish hatchery in Nebraska and had a mean weight of 1.0 g and a mean length of 42 mm. The dynamic bioassay was conducted using a continuous-flow proportional dilution apparatus (Mount and Brungs, 1967)[1]. The apparatus provides for intermittent introduction of seven concentrations of the test compound into test vessels and diluent water to a vessel serving as a control unit. Flow rate to each of the 30-liter test vessels was 5 l/hour throughout the test period.

The test diluent consisted of aerated well water cf pH 7.1, total hardness 36 mg/l as $CaCO_3$, and a constant temperature of 18C ($\pm$ 1.0). Dissolved oxygen levels for the test ranged from 9.1 to 9.3 mg/l. Thirty specimens were introduced 48 hours perior to the start of the assay into each test unit. The desired concentrations of the test compound were established after the 48 hour acclimation period in the test vessels by adding sufficient amounts of stock solution containing the compound dissolved in acetone to each test vessel. The proportional dilution apparatus was then used to maintain the desired concentration of the compound in each test vessel.

The predicted TL_{50} value and its 95% confidence intervals were arrived at by converting the concentrations tested and the corresponding observed percent mortalities to logs and probits, respectively. These values were then used to calculate a linear regression equation.

---

[1] Mount, D. I. and W. A. Brungs. 1967. A simplified dosing apparatus for fish toxicology studies. Water Research. 1:21.

Table 2 -- Concentrations of Dyfonate tested and corresponding observed percent mortalities for bluegill (Lepomis macrochirus), after 24 and 96 hours of exposure and end of test.

Concentration (mg/l)	% mortality observed		
	24 hour	96-hour	Incipient
			192 hours
0.030	0	57	97
0.023	0	17	70
0.017	0	23	73
0.013	0	3	40
0.010	0	0	7
0.007	0	0	7
0.005	0	0	0
Control	0	0	0

EEB Probit Calculation: LC_{50} = 0.029 (.0255-.0373) ppm

Slope = 4.87 $p > Chi^2 = .25$

LC_{10} = 0.016 ppm (no confidence limits printed)

Conclusions/Validation Rationale: The studied generally followed EPA recommended practices and is considered scientifically sound. The LC50 was not calculated by recommended methods (probit analysis) but a recalculation by the reviewer showed the difference was trivial.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054547

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00062188 CONTENT CAT 01

Butler, P.A. (1965) Commercial fishery investigations. Pages 65-77, In Effects of Pesticides on Fish and Wildlife. Washington, D.C.: U.S. Fish and Wildlife Service. (Circular 226; Chemagro report no. 28012; available from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; 1966 0--797-999; published study; CDL; 092011-R)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: EEB -40-25401547 EEB -40-05054547

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: The studies are considered scientifically sound and demonstrate that dyfonate is highly toxic to spot, oysters, and brown shrimp. The studies partially fulfill requirements for acute toxicity testing with marine species, however, the need for such testing has not been established.

Reviewer: Richard Balcomb
Date: Nov 29 1982
Chemical: Dyfonate (N-2790) - Tech*

Citation: Bulter, P.A. 1965. Commercial Fishery Investigations. pp 65-77 In Effects of Pesticides on Fish and Wildlife. Circular 226, U.S. Fish and Wildlife Service.

Test Type: Oyster Shell Deposition EC_{50} (96-h)
shrimp 48-h LC_{50}
Estuarine Fish 48-h LC_{50}

Methods:*

Acute toxicity of pesticides to oysters. Acute toxicity was determined by exposing separate groups of small oysters (1" - 2") to several concentrations of the pesticide for a period of 96 hours. Tests are conducted in flowing sea water aquaria to which acetone stock solutions of the pesticide are introduced at a continuous rate. Average shell growth of oysters in each test concentration was compared with a group of control oysters receiving the same volume of flowing sea water but no pesticide. The edge of the shell of each oyster is ground evenly at the beginning of the test so that new shell growth can be objectively measured. The effective concentration of pesticide in sea water causing 50% decrease in shell growth (96 hr. EC_{50}) was estimated by graphical interpolation. Recovery rate of shell growth is determined by transferring surviving experimental oysters to unpolluted water until their growth rate equals that of control oysters.

Acute toxicity of pesticides to estuarine fish (Spot). Separate groups of fish were exposed in flowing sea water to several concentrations of the chemical and 24 and 48-hour EC_{50} values (concentration of pesticide in sea water causing 50% mortality) determined. Stock solutions of the pesticide are made up in acetone and metered into the flowing sea water to obtain the desired concentration.

Acute toxicity of pesticides to shrimp. The tests were conducted in the same manner as the previously described fish tests except death or loss of equilibrium were used as criteria for observed toxic effects.

Note: The marine species toxicity data reviewed here were also provided in the following reports:

Fiche/Master ID
59215
27094
28589
32791
75787
41484
87970

A full review is provided only for the present submission, which is a published version of the data.

* As the methods were described somewhat more fully in report Fiche No. 59215, I relied on it for such information (material was quoted and paraphrased).

Results:

Species	LC50/EC50 (Time)	Ave Temp (C)
Brown Shrimp[1]	0.0019 ppm (48-h)	29
Spot[2]	0.24 ppm (48-h)	24
Oyster[3]	0.33 ppm (96-h)	25

[1] Penaeus aztecus - adult

[2] Leiostomus xanthurus - juenvile

[3] Crassostrea virginica (1" - 2")

Validation Category: Supplemental

Category Rationale: These data are considered scientifically defensible but the reports do not provide indepth methodology nor sufficient dose mortality information for detailed validation. The data show that Dyfonate is highly toxic to marine Fish and invertebrates (LC_{50} < 1 ppm).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00027094 CONTENT CAT 02

Lowe, J.I. (1964) Gulf Shellfish: Effects of Pesticides, (Unpublished study including letter dated Jul 28, 1964 from J.I. Lowe to H.E. Fairchild, received Jul 28, 1964 under unknown admin. no.; prepared by U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, submitted by Ciba-Geigy, Greensboro, N.C.; CDL: 131211-A)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: EEB -40-05054547

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103043

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00028589 CONTENT CAT 02

Anon, (1965) Effects of Pesticides on Fish and Wildlife: 1964 Research Findings of the Fish & Wildlife Service. N.P. (Fish and Wildlife Circular 226; p. 73 only; also In unpublished submission received Mar 18, 1980 under 6F1851; submitted Shell Chemcial Co., Washington, D.C.; CDL:099341-AE)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

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SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103047

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00075787 CONTENT CAT 11

Butler, P.A. (1964) Commercial fishery investigations. Pages 65-73, In The Effects of Pesticides on Fish and Wildlife. By U.S. Fish and Wildlife Service. ?: USFWS. (Circular 226; published study; CDL:091155-U)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00087970 CONTENT CAT 02

U.S. Fish & Wildlife Service (1965) Effects of Pesticides on Fish and Wildlife: 1964 Research Findings of the Fish & Wildlife Service. ?: U.S.F.W.S. (Page 73 only; Fish and Wildlife Service circular 226; published study; CDL:000875-AA)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103040

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00041484 CONTENT CAT 02

Butler, P.A. (1964) Commercial fishery investigations. Pages 65-73, In The Effects of Pesticides on Fish and Wildlife. By U.S. Fish and Wildlife Service. ?: USFWS. (Published study CDL:094524-R)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
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SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00059215 CONTENT CAT 01

Lowe, J.I. (1974) Effects of Pesticides--Laboratory Studies. Annual rept., Jul 1, 1963-June 30, 1964. (U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Biological Laboratory; unpublished study including letter dated Jul 28, 1964 from J.I. Lowe to H.E. Fairchild; CDL:)90627-K)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE 26 Nov 1982

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data were reviewed previously - see Fiche 62188.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00080622 CONTENT CAT 02

Lowe, J.I. (1964) Letter sent to H.E. Fairchild dated Jul 28, 1964 Acute toxicity tests 1. (U.S. Fish and Wildlife Service, Bureau of Commericial Fisheries, Biological Laboratory; unpublished study, including Geigy Chemical Corp. CDL: 091109-P)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
SEC: EEB -40-05054543

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-26-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: Data are not relevant to this registration standard (they do not pertain to fonofos).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 04 - GRANULAR

FICHE/MASTER ID 00090902 CONTENT CAT 02

Stauffer, Chemical Company (1979) Toxic Effects of Dyfonate 20-G on Birds 1. (Compilation; unpublished study received Oct 24, 1979 under 476-1995; CDL: 241307-M)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 30 Nov END DATE 30 Nov

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-30-80

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: Submission contains six testimonials from state entomologists/agricultural agents indicating that granular Dyfonate has not caused bird kills. The data can not be validated nor used in a quantitative risk analysis.

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100542

FORMULATION 01 - TECHNICAL CHEMICAL

FICHE/MASTER ID 00090897 CONTENT CAT 11

Stauffer, Chemical Company (1975?) Avian Toxicity Data--Dyfonate. Summary of studies 241307-J and 241307-K. (Unpublished study received Oct 24, 1979 under 476-1995; CDL:241307-A)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 7 Dec 82 END DATE 7 Dec 82

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 7 Dec 82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusion: This document is a one page summary of bird toxicity data that has been validated in reviews of the primary documents (00022923,00090820,00092027).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100042

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00092026 CONTENT CAT 02

Kamienski, F.X.; (1973) Effects of Technical Dyfonate on Quail 1: FSDS No. A-7018. (Unpublished study received Oct 24, 1979 under 476-1995; submitted by Stauffer Chemical Co., Richmond, Calif.; CDL:241307-E)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
PRIM: RCBR-25-10162010

DIRECT RVW TIME = (MH) START-DATE 7 Dec 82 END DATE 7 Dec 82

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 7 Dec 82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: These data are a supplement to a study that was previously validated (see fiche 90898)

Reviewer: Richard Balcomb

Date: 7 Dec 1982

Chemical: Fonofos (Dyfonate) Technical 95.1% a.i.

Citation: Kamienski, F.X. 1973. Dyfonate Feed Study -- Quail Tissue Residues: Toxicology Laboratory Report T-1664. Stauffer Chemical Company, Richmond, CA.

Fiche No. = 90898

Study type: Avian Chronic Feeding Study
Test Species: Pharaoh quail (Coturnix coturnix)

SUMMARY - Results*

No significant effects on gross appearance, behavior, body weights or egg production were reported for test and control birds during the 28 day test period. No significant residues of Dyfonate were reported in the liver. Muscle, fat or eggs of quail fed technical Dyfonate for 14 or 28 days at dietary levels of 5, 11 and 26 ppm.

MATERIALS*

Technical Dyfonate (95.1%), Lot NO. 1369-29, Stauffer Chemical Company, was used in this study. Adult Pharaoh quail (Coturnix coturnix), 10-12 weeks of age, 165-210 g in weight, were obtained from Marsh Farms in Garden Grove, California. Purina Turkey starter chow was used.

METHODS*

A total of 48 birds (24 males, 24 females) were used in this study. They were housed by groups of three birds (of the same sex).
Food was available ad libitum. The birds were acclimatized for a period of two weeks prior to initiation of Dyfonate feeding. The gross appearance, behavior and egg production of the test birds were recorded throughout the study. Body weights were recorded for all birds on day 0, and on days 14 and 28 for the birds sacrificed at those intervals.

Four dietary levels of Dyfonate were fed: 0 ppm (control), 5 ppm, 11 ppm and 26 ppm.

Six males and six females were tested at each of the four feeding levels. After 14 days feedng, three males and three females at each test level were sacrificed and the body weights recorded. The liver, skeletal muscle and fat tissue were removed and immediately frozen. The remaining six birds at each test level were fed an additional 14 days, sacrificed, body weights recorded, and the tissues removed as described above. Eggs were collected from females on days 13 + 14 and on days 27 + 28. The frozen tissues and eggs were analyzed for residues of Dyfonate and its oxygen analog by gas chromatography.

RESULTS*

A. Dyfonate Feed Analyses

The actual concentrations of Dyfonate in the feed, as determined by gas chromatography, were 0.0 (control), 5.0, 11.2 and 26.1 ppm.

B. Clinical Observations

The gross appearance, behavior, weight gain and egg production of the test birds (as compared to the control birds) were normal throughout the course of this study. The average body weights of the quail at the 0, 14 and 28 day test periods are listed in Table 1.

C. Dyfonate Tissue Residue Levels

Results of the analyses for Dyfonate and Dyfonate oxygen analog in the liver, skeletal muscle, fat tissues and eggs of control and teated birds after the 14 and 28 day test periods are summarized in Table 2.

No significant residues of Dyfonate or its oxygen analog were detected in the liver, muscle tissues, fat tissues, or eggs of test animals. Residue levels of Dyfonate in tissues and eggs did not exceed 0.010 ppm; oxygen analog residues in all tissues did not exceed 0.002 ppm.

Validation Category: Supplemental

Category Rationale: The study is scientifically sound and indicates that fonofos and its oxygen analog do not significantly accumulate in Coturnix tissue. This study also demonstrates that quail will tolerate fonofos up to 4 weeks at dietary concentrations of 5-28 ppm without overt toxic symptoms. The study is rated supplemental as: (1) the test species is not recommended by EPA guidelines (2) there were relatively few test birds (6 per sex per concentration - EPA recommends >12 hens per concentration) (3) the study was relatively short (4 wks - EPA requires 16 wk chronic bird tests (4) numerical summary of egg production was not reported (5) Eggs were not incubated and hatched - (used for residue analysis only) (6) raw data on body weights and egg production were not reported therefore a statistical validation could not be performed.

*Qouted or paraphrased from original

Table 1 (from original)

Body Weights of Test Birds

Dietary Level	Average Body Weights, grams		
	0-Day Pretest	14-Day Test Period[a/]	28-Day Test Period[b/]
0 ppm (control)	176	211	217
5 ppm	194	228	233
11 ppm	183	217	223
26 ppm	177	200	219

a/ Mean body weights of birds sacrificed after 14 days feeding.

b/ Mean body weights of birds sacrificed after 28 days feeding.

Table 2 (from the original)

Residues (In PPM) of Dyfonate and Its Oxygen Analog in Quail Tissues and Eggs

Tissues	Feed Level-	14 DAYS				28 DAYS			
		Dyfonate		Oxygen Analog		Dyfonate		Oxygen Analog	
		Male	Female	Male	Female	Male	Female	Male	Female
Liver	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000
	11	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	26	0.009	0.005	0.001	0.000	0.010	0.000	0.000	0.000
Muscle	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	11	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000
	26	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fat	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	11	0.000	0.001	0.000	0.000	0.002	0.002	0.000	0.000
	26	0.000	0.003	0.000	0.000	0.001	0.002	0.000	0.000
Eggs	0		0.000		0.000		0.000		0.000
	5		0.000		0.000		0.001		0.000
	11		0.000		0.000		0.002		0.000
	26		0.003		0.000		0.006		0.000

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05100542

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00090898 CONTENT CAT 01

Kamienski, F.X.; Bullock, C.H.; O'Connor, M. (1973) Dyfonate Feed Study -- Quail Tissue Residues: Toxicology Laboratory Report T-1664. (Unpublished study received Oct 24, 1979 under 476-1995; submitted by Stauffer Chemical Co., Richmond, Calif.; CDL: 241307-D)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
PRIM: EEB -35-05100042 RCBR-25-10162010

DIRECT RVW TIME = (MH) START-DATE 7 Dec 82 END DATE 7 Dec 82

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 7 Dec 82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: This study is considered scientifically sound and demonstrates that dyfonate technical, at dietary concentrations of 5-28 ppm, produces no overt toxic symptoms in the course of a 4 weeks exposure to Coturnix quail. Dyfonate did not accumulate in tissues or eggs. The study had deficiencies in test design and test species. Insufficient raw data was available for statistical validation. No data requirements are fulfilled by this research (supplemental data were submitted in document 00092026).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 201024007

FORMULATION 90 - FORMULATION NOT IDENTIFIED

FICHE/MASTER ID 00029873 CONTENT CAT 11

Elliott, M. (1976) Properties and applications of Pyrethroids. Environmental Health Perspectives 14(?/Apr):3-13. (Also In unpublished submission received Feb 20, 1980 under 59-194; submitted by Burroughs Wellcome Co., Research Triangle Park, N.C.; CDL:099257-C)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS
PRIM: EFF -10-0524007

DIRECT RVW TIME = (MH) START-DATE 7 Dec 82 END DATE 7 Dec 82

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 7 Dec 82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: Research presented in this published paper is not directly relevant to Fonofos (no fonofos data presented).

The following studies were obtained independently of the PSD literature search and are not catalogued.

FORM I

TDMS DATA EVALUATION RECORD PAGE 1 OF

CASE GS ___ ~~DICROTOPHOS~~ Fonofos PM ___ ___/___/___

CHEM 035201

BRANCH EEB DISC ___

FORMULATION Technical - 90% a.i.

FICHE/MASTER ID GEODIC01 GS0003503

CITATION: Johnson, W.W. and M.T. Finley. 1980. Handbook of acute toxicity of chemicals to fish and aquatic invertebrates. U.S. Dept. of interior, Fish and Wildlife Service Resource Publ. 137. 98pp. Washington, D.C.

SUBST. CLASS=

OTHER SUBJECT DESCRIPTORS
PRIM:

DIRECT REVIEW TIME= 3 (MH) START DATE 10/22/81 END DATE 10/22/81

REVIEWED BY: Mary L. Gessner
TITLE: Fishery Biologist
ORG: HED/EEB
LOC./TEL: CS#4 557-5651

SIGNATURE: Mary L. Gessner DATE: 11/11/81

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Comments: The fonofos LC_{50} studies contained in this handbook are considered scientifically sound and indicate that fonofos is highly toxic to [illegible] that those data

Reviewer: Richard Balcomb
Date: 19 Nov 1982

Chemical: Fonofos
Formulation: Technical (See Fiche/Master ID 75542 for formulation identification)

Citation: Johnson, W.W. and M. T. Finley. 1980. U.S. Department of Interior, Fish and Wildlife Service. Handbook of Acute Toxicity of chemicals to Fish and Aquatic Invertebrates. Resource Publication No. 137.

Results:

Compound and test organism	wt(g)	Temp (C)	96-h LC-50 (mg/L)	95% CI
Rainbow trout	1.7	13	0.020	0.016-0.025
Bluegill	1.0	24	0.007	0.005-0.009

Validation Category: Core

Category Rationale: Fish acute toxicity studies by the U.S. Department of Interior, National Fisheries Research Laboratory, Columbia, Missouri, are considered scientifically sound by EEB and receive abbreviated review (H. Craven, pers. commun.). These studies demonstrate that dyfonate is highly toxic to the tested species and fulfill requirements for short-term acute freshwater fish bioassays (warmwater and coldwater species).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 01 - TECHNICAL CHEMICAL

FICHE/MASTER ID 00084747 CONTENT CAT 02

Cope, O.B. (1964) Letter sent to G.D. Meyding dated Oct 20, 1964 Toxicity of Ordram and other chemicals to rainbow trout 1: Stauffer 1 T-2207. (U.S. Fish and Wildlife Service, Fish-Pesticide Research Laboratory; unpublished study; CDL:246020-N)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 30 Nov END DATE 30 Nov

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-30-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: Enclosed fish toxicity data were reviewed in a previous validation (see Johnson and Finley 1980; Fiche/Master ID unassigned).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 0-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05103043

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00029839 CONTENT CAT 02

U.S. Fish and Wildlife Service (1964) Laboratory Studies. (Unpublished study received on unknown date under unknown admin. no.; submitted by Elanco Products Co., Div. of Eli Lilly and Co., Indianapolis, Ind.; CDL:131189-C)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE END DATE

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-30-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: Enclosed fish toxicity data were reviewed in a previous validation (Johnson and Finley, 1980 - No Fiche ID).

(TDR03B) DATA EVALUATION RECORD PAGE 1 OF

CASE GS0105 FONOFOS PM 300 07/15/82

CHEM 041701 O-Ethyl S-phenyl ethylphosphonodithioate

BRANCH EEB DISC 40 TOPIC 05054543

FORMULATION 01 - TECHNICAL CHEMICAL

FICHE/MASTER ID 00075542 CONTENT CAT 11

U.S. Fish and Wildlife Service (1965) Effcts of Pesticides on Fish and Wildlife: 1964 Research Findings of the Fish and Wildlife Service. Washington, D.C.: USFWS. (Circular 226; pp. 1,2,51-63 only; available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402; published study; CDL: 221963-B)

SUBST. CLASS = S.

DIRECT RVW TIME = (MH) START-DATE 19 Nov END DATE 19 Nov

REVIEWED BY: Richard Balcomb
TITLE: Wildlife Biologist
ORG: TS-769 EEB/HED
LOC/TEL: 703-557-7695

SIGNATURE: DATE: 11-19-82

APPROVED BY:
TITLE:
ORG:
LOC/TEL:

SIGNATURE: DATE:

Conclusions: Data were reviewed previously in a validation of Johnson and Finley (1980, no fiche/master ID assigned). Data are scientifically sound and demonstrate that dyfonate is highly toxic to fish.

D E R

Chemical: fonofos

Formulation: Dyfonate 10 & 20 G

Fiche/master ID: none

Citation: Booth, G. M. and M. W. Carter. 1980. A simulated field study of the effect of Dyfonate 10G and 20G on bobwhite quail. Brigham Young University.

EPA Accession No.: 243582

Reviewer: Richard Balcomb Date: 10 Dec 1982

Comment: The study is considered scientifically sound and fulfills testing requirements for a simulated avian toxicity study in corn. Results indicate that broadcast application of Dyfonate 10G resulted in 23% depression in brain AChE but no mortality in exposed quail. Application of the 20 G formulation reduced AChE levels 34% and killed 15.4% of the exposed female quail.

Reviewer: Richard Balcomb
Date: 10 Dec 1982

Chemical: Dyfonate 10 and 20 G

Citation: Booth, Gary M. and Melvin W. Carter. 1980. A simulated Field study of the effect of Dyfonate 10G and 20G on Bobwhite Quail. Brigham Young University for Stauffer Chemical Company.

Accession Number: 243582
Fiche ID: not assigned

Test Type: Simulated field study - bobwhite

Abstract: (Quoted form the report)

"The objective of this experiment was to evaluate the impact of Dyfonate 10G and 20 G on bobwhite quail mortality, behavior, weight gain, acetylcholinesterase(AChE) levels, and histopathology.

The data from this study showed the following:

1. Dyfonate 10 G did not cause significant mortality, while the 20 G formulation resulted in 15.3% mortality primarily to bobwhite females.

2. A total of 1 bird, 8 birds, and 16 birds exhibited behavioral deficits in the control, 10 G, and 20 G pens respectively. However, 19 of the effected (SIC) birds in the 10 G and 20 G pens appeared in the first 8 days post-treatment. Therefore, it (is) not expected that this compound would adversely affect a given quail community except in the first week of treatment.

3. Dyfonate 10 G did not affect weight gain in quail, but the 20 G formulation significantly inhibited female weight gain.

4. Brain AChE levels were depressed by 23% in the 10 G-treatments and 34% in the 20 G treatments. However, these inhibition levels did not seem to cause any overt symptoms of poisoning. In other words, quail apparently are able to sustain at least 34% AChE inhibition without adversely affecting the birds.

5. Overall, Dyfonate 10 G does not pose a hazard to bobwhite quail under these experimental conditinos; but, when the 20 G formulation is broadcast in a similar manner, it causes significant mortality, behaioral deficits early in the treatment, significant weight loss to females, and reduced AChE levels in the brain.

6. It is expected that if the 20 G were band incorporated, the hazard to bobwhite quail would be reduced significantly.

7. Also, if the 20 G granules were to be broadcast as a foliar application, it is likely that the hazard to bobwhite quail would be minimal.

8. Histopathology data showed no treatment-related lesions.

Study Design:
- 27 pens (10ftx50ft) were constructed in a corn field (9 control pens and 9 pens in each treatment group).
- 8 mated pairs of bobwhite were maintained in each pen (total=432 birds: 144 controls and 144 in each treatment). Birds were 16-weeks old.
- Dyfonate 10-G and 20-G were braodcast at the rate of 4 lbs a.i./acre. (birds present)
- Water was available ad libitum. 20 grams of feed were scattered per bird per day.
- Study duration was 28 days

Parameters Analyzed: mortality, behavior, body weight, crop weight, fat weight, AChE activity and histopathology

Results and Discussion. (largely paraphrased from original)

Mortality. Table 1 summarizes the quail mortality data by treatment and by sex following a simulated 28-day field exposure of Dyfonate 10 G and 20 G. Only 1 male death was reported (1.4%) in the control pens, while 3 females died (4.2%) in the 10 G pens; however 8 females (11.1%) and 3 males (4.2%) died from the 20 G pens.

Of the 14 birds that died in both the 10 G and 20 G pens, 11 died during the first 5 days post-treatment. No birds died during the last week of the study (Table 2).

Table 3 tabulates the general Chi-square determinations of the quail mortality using weighted least squares analysis. The data show a significant difference when the mortality between all treatments are compared ($P = 0.0182$). This significance was due to the differences in mortality between all control birds and all 20 G-treatment birds ($P = 0.005$). Significance was due primarily to the mortality of control females versus the mortality of the 20 G-treatment females ($P = 0.0065$). The differences in mortality between all control birds versus all 10 G birds were not significant ($P = 0.3633$).

Abnormal behavior. Behavioral deficits were observed in 16 20 G-pen birds, 8 10 G-pen birds, and 1 control birds Of the 10 G and 20 G birds, aproximately one-half of the abnormalities were observed in the males and one-half in the females. Thus there was no indication that females had more behavioral symptoms than males.

Acetylcholinesterase activity. Results suggest a dose-response effect. There was a 23% depression of pooled male and female brain AChE at the 10 G level and a 34% depression of pooled male and female AChE at the 20 G treatment. The researchers concluded that since all of these birds at the time of sacrifice had normal behavior, bobwhite can withstand at least 34% inhibition of brain AChE without harmful effects. Males and females responded in almost an identical manner to the treatments.

Validation Category: Core

Category Rationale: The study exceeds EPA (1978) requirements for simulated avian field studies and is considered scientifically sound. The study demonstrates that broadcast application of dyfonate may cause some mortality in adult quail and result in widespread depression of AChE in exposed birds.

Table 1. Summary of quail mortality by treatment and sex following 28 days exposure to one simulated field application of 4 lbs. a.i./A of Dyfonate 10 G or Dyfonate 20 G.

Treatment	Number of birds dead	% Mortality (N = 72 per treatment)
control - males	1	1.4
control - females	0	0
10 G - males	0	0
10 G - females	3	4.2
20 G - males	3	4.2
20 G - females	8	11.1

Ecological Effects Branch Analysis of Mortality (adjusted Chi-square)*:

Comparison	X^2	P
Control vs. 10-G	0.86	>0.30
Control vs. 20-G	7.36	<0.01

$$* \ X^2 = \frac{N\,(|ad - bc|) - N/2)^2}{(a + b)\,(c + d)\,(b + d)\,(a + c)}$$

Table 2. Quail mortality by treatment, sex, and day of study. The day of treatment was Nov. 21, 1979.

Day of study	Date	Number of birds dying		
		Control	10 G	20 G
1	Nov. 22	0	1♂	3♂, 1♀
2	Nov. 23	0	1♂	0
3	Nov. 24	0	0	2♂, 1♀
4	Nov. 25	0	0	1♂
5	Nov. 26	0	1♂	0
6	Nov. 27	0	0	0
7	Nov. 28	0	0	0
8	Nov. 29	0	0	0
9	Nov. 30	0	0	0
10	Dec. 1	0	0	0
11	Dec. 2	0	0	0
12	Dec. 3	1♀	0	0
13	Dec. 4	0	0	0
14	Dec. 5	0	0	0
15	Dec. 6	0	0	0
16	Dec. 7	0	0	0
17	Dec. 8	0	0	2♂
18	Dec. 9	0	0	0
19	Dec. 10	0	0	0
20	Dec. 11	0	0	1♀
21	Dec. 12	0	0	0
22	Dec. 13	0	0	0
23	Dec. 14	0	0	0
24	Dec. 15	0	0	0
25	Dec. 16	0	0	0
26	Dec. 17	0	0	0
27	Dec. 18	0	0	0
28	Dec. 19	0	0	0

Table 3. Summary of generalized Chi-square determinations (from the original paper) using weighted least squares analysis of the quail mortality (categorical) data from Table 1. (See Table 1 for EEB statistical validation of mortality summary).

Contrast Matrix	Chi-square	DF	Probability factor (P)
All Treatments	8.0092	2	0.0182*
C vs. 10 G	0.8264	1	0.3633
C vs. 20 G	7.8796	1	0.0050**
Trt. X sex	3.7783	2	0.1512
(C vs. 10 G) X sex	1.8678	1	0.1717
(C vs. 20 G) X sex	2.6425	1	0.1040
C o vs. 10 G o	0.1717	1	0.6786
C ° vs. 10 G °	1.8626	1	0.1723
C o vs. 20 G o	1.0360	1	0.3088
C ° vs. 20 G °	7.4073	1	0.0065**

* significant at $p \leq 0.05$

** significant at $p \leq 0.01$

D E R

Chemical: fonofos

Formulation: Dyfonate 20 G

Fiche/master ID: none

Citation: Booth, G. M. and M. W. Carter. 1980. A simulated field study of the effect of band-incorporated Dyfonate 20G on bobwhite quail. Brigham Young University.

EPA Accession No.: 243582

Reviewer: Richard Balcomb Date: 11 Dec 1982

Comment: The study is considered scientifically sound and fulfills testing requirements for a simulated avian toxicity study in corn. Results indicate that a band-incorporated application of Dyfonate 20 G had no significant effect on exposed bobwhite.

Reviewer: Richard Balcomb
Date: 11 Dec. 1982

Chemical: Dyfonate 20-G

Citation: Booth, Gary M. and Melvin W. Carter. 1980. A simulated Field study on the effect of band-incorporated Dyfonate 20-G on Bobwhite Quail. Brigham Young University for Stauffer Chemical Company.

Accession No: 243582
Fiche ID: unassigned

Test type: Simulated avian field study

Abstract: (Quoted from the report)

"The objective of this study was to evaluate the effect of band-incorporated Dyfonate 20 G to bobwhite quail under simulated field conditions.

The parameters evaluated included mortality, behavior, initial weight, final weight, crop weight, fat weight, brain weight, acetylcholinesterase (AChE) activity, and weight change.

The results showed the following:

1. Treatment mortality was not signifcantly different from the controls.

2. Quail behavior was normal in both the treatment pens and the controls pens.

3. Initial weight, final weight, crop weight, fat weight, AChE levels, and weight change were not significantly different between the treatment and control bird.s

4. Brain weight was slightly higher in the treatment birds ($\bar{x}$ = 0.98684 g) compared to the controls (x = 0.96489 g). But since this difference only represented a 22 mg change and since no other related parameters (i.e. weight change, AChE activity, crop weight, fat weight) were significantly different, this difference likely has no biological meaning. In addition, when relative brain weights (brain weight/body weight) were calculated, there were no significant differences between control brain weights and treatment brain weights.

5. Under the conditions of this experiment, Dyfonate 20 G when band-incorporated at 5 lbs /acre clearly does not cause significant harm to bobwhite quail."

Study Design: - 18 pens (20ftx40ft) were constructed in a corn field

- 8 mated pairs of bobwhite were maintained in each pen (total=288 birds: 144 controls and 144 treatment). Birds were 20-weeks old.

- Dyfonate 20-G was applied at 5 lbs/acre by a John Deere Max-emerge planter. The planter was raised in each pen area to permit a row-end spill simulation.

- Water was available ad libitum. 20 grams of feed were scattered per bird per day.

- Study duration was 28 days

Parameters Analyzed: mortality, behavior, body weight, crop weight, fat weight, brain weight and AChE activity

Results: Three control males died (4.2%) while no mortality occurred among treated males. Seven control females died (9.7%) as opposed to 11 in the treated groups (15.3%). Differences were not statistically significant.
The only statistically different parameter between treatment and controls was in brain weight (treatment 0.98684 g vs. 0.96489 g controls).

Researcher concluded that the pesticide did "not cause signifcant harm to bobwhite quail".

Validation Category: Core

Category Rationale: The study is considered scientifically sound. This research demonstrates that Dyfonate 20-G poses low to negligible hazards to bobwhite under the soil-incorporation and pen conditions tested. The study design meets or exceeds EPA (1978) simulated field testing requirements.

Table 1. Summary of quail mortality by treatment and sex following 28-days exposure to one band-incorporated field application of 5 lbs a.i./acre of Dyfonate 20 G.

Treatment	Number of birds dead	% Mortality (N = 72 birds per sex)
Control males	3	4.2
Control females	7	9.7
20 G males	0	0.0
20 G females	11	15.3

Ecological Effects Branch
Statistical Analysis (Chi-square)

Comparison	X^2	P
Control Female vs Treated females[1]	.57	> 0.3 n.s.
All controls vs All Treated [2]	.051	>0.8 n.s.

[1] adjusted Chi-square: $$X^2 = \frac{N\left(|ad - bc| - \frac{N}{2}\right)^2}{(a+b)\,(c+d)\,(b+d)\,(a+c)}$$

[2] traditional Chi-square: $$X^2 = \frac{N\,(ad - bc)^2}{(a+b)\,(c+d)\,(b+d)\,(a+c)}$$

(From the original)

Table 5. Summary of the control and treatment means[a] for initial weight, final weight, crop weight, fat weight, brain weight, ACHE, and weight change.

	SAMPLE SIZE	MEAN	STD. ERROR OF THE MEAN
		INITIAL WT.	
T (1) CONTROL	123.00	186.34612	0.91432
T (2) 20 G.	124.00	187.53683	0.90764
		FINAL WT.	
T (1) CONTROL	123.00	175.28298	0.85317
T (2) 20 G.	124.00	176.90635	0.84694
		CROP WT.	
T (1) CONTROL	123.00	0.78929	0.02799
T (2) 20 G.	124.00	0.77438	0.02778
		FAT WT.	
T (1) CONTROL	123.00	0.35671	0.04399
T (2) 20 G.	124.00	0.35179	0.04366
		BRAIN WT.	
T (1) CONTROL	123.00	0.96489	0.00631
T (2) 20 G.	124.00	0.98684	0.00627
		ACHE	
T (1) CONTROL	123.00	173.94132	2.02167
T (2) 20 G.	124.00	174.35435	2.00689
		WT. CHANGE	
T (1) CONTROL	123.00	-11.06314	1.38358
T (2) 20 G.	124.00	-10.63048	1.37347

[a]These means have been adjusted for the effect of unbalance in regards to the other factors in the model.