

CASE GS0178

GLYPHOSATE

PM 25 06/16/83

CHEM 103601

Isopropylamine glyphosate (N-(phosphon

BRANCH EEB

DISC 40 TOPIC 05054543

FORMULATION 00 - ACTIVE INGREDIENT

FICHE/MASTER ID 00108171

CONTENT CAT 01

EG & G, Bionomics (1975) Chronic Toxicity of Glyphosate to the Fat-head Minnow (Pimephales promelas, Rafinesque). (Unpublished study received Dec. 27, 1978 under 524-308; submitted by Monsanto Co., Washington, DC; CDL:097759-B)

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS

SEC: EEB -40-10200043

EEB -40-05151543

DIRECT RVW TIME =

(MH)

START-DATE

END DATE

REVIEWED BY: Dennis J. McLane

TITLE: Wildlife Biologist

ORG: EEB/HED

LOC/TEL:

SIGNATURE:

Dennis J. McLane

DATE: 9-8-85

APPROVED BY:

Raymond W. Mathews

TITLE:

Supervisory Biologist

ORG:

LOC/TEL:

EEB/HED

SIGNATURE:

Raymond W. Mathews

DATE: 9-9-85



DATA EVALUATION RECORD

1. Chemical: Glyphosate S# 103601
2. Test Material: 87.3% ai glyphosate
3. Study Type: Pimephales promelas Rafinesque Life Cycle Study
4. Study ID: EG&G, Bionomics (1975) Chronic Toxicity of Glyphosate to the Fathead Minnow (Pimephales promelas, Rafinesque). (Unpublished study received December 27, 1978, under 524-308; submitted by Monsanto Co., Washington, DC; CDL:097759-B)

5. Reviewed by: Dennis J. McLane
Wildlife Biologist
EEB/HED

Signature: *Dennis J. McLane*

Date: 9-9-85

6. Approved by: Raymond W. Matheny
Supervisory Biologist
EEB/HED

Signature: *Raymond W. Matheny*

Date:

9-9-85

7. Conclusion:

This study can be used for hazard assessment purposes. Also, it meets the guideline requirements. Using the toxicity categories of Brooks et al. (1973) the MATC of > 25.7 mg/L would place technical glyphosate into the category of no more than slightly toxic.

8. Recommendation:

N/A

9. Background:

This study was received December 27, 1978, and first reviewed on August 8, 1979, by D. McLane. The present review is a result of the Registration Standard for glyphosate.

10. Discussion of Individual Tests:

N/A

11. Materials and Methods: (excerpted from citation)

- a. Test Procedure: Chronic exposure of fathead minnows to glyphosate began January 27, 1975, with eggs from the brood stock at the Aquatic Toxicology Laboratory of E G & G, Bionomics, Wareham, Massachusetts. Two groups of thirty eggs were incubated in each test aquarium by means of an egg cup and oscillating rocker arm apparatus (Mount, 1968). Dead eggs were removed and counted each day until hatching was completed (4 days at 25 °C). Percent hatch was based on the number of live fry from 60 eggs. Forty fish divided into two groups of twenty each were randomly selected and distributed to growth chambers in each aquarium. Two growth chambers were used to facilitate handling of fry for 30 and 60 day measurements by a photographic method (McKim and Benoit, 1971). Percent survival based on cumulative mortality was also determined at these intervals. After 60 day measurements, the number of fish released to each spawning chamber was impartially reduced to fifteen after combining fish from the growth chambers. Fathead minnows were fed 3-4 times daily with brine shrimp nauplii during the first 45 days after which fish were fed frozen brine shrimp adults twice daily ad libitum. All tanks were siphoned twice weekly to remove fecal material, excess food and detritus, and were brushed when algal growth became excessive.

On day 64, five spawning sites made of halved, three inch sections of amber glass bottles were placed, concave side downward, at locations in the spawning chamber which minimized the chance of encounters by individual, egg guarding territorial males.

When secondary sexual characteristics were well developed (circa day 134) the number of fish in each tank was reduced initially to four males and four females and subsequently (day 179) to two males and four females. This latter action was taken based on recent evidence that fewer fish in the spawning chamber and a lower ratio of males:females results in increased spawning activity.

When spawning began (circa day 112) eggs were removed from the underside of spawning tiles after 1:00 p.m. daily. Eggs of each spawn were counted with an effort to replace tiles to their proper location as soon as possible. Fifty eggs from each of the first ten spawnings in each tank were then oscillated in their respective test waters by means of the egg cup and rocker arm apparatus. Dead eggs were removed and

counted each day until hatching was completed (3-5 days at 25°C). Percent hatch was based on the number of live fry from 50 eggs. Twenty fry from the first two spawns in each tank in which at least 80 percent live hatch was observed were placed in their respective growth chambers. Control egg groups were transferred to the aquarium where adult fish were accidentally killed due to a diluter malfunction early in the spawning period. Control eggs were used to assess the effect of this concentration on hatchability, and the resulting fry were placed in growth chambers for further observations. Fry were fed brine shrimp nauplii ad libitum 3-4 times daily. After 30 days exposure, fry groups were terminated and total lengths determined by the photographic method. Total wet weight and percent survival were also determined at this time for each fry group.

- b. Statistics: Measured biological parameters from duplicate aquaria during chronic exposure were averaged and means subjected to analysis of variance according to Steele and Torrie (1960). When treatment effects were indicated, the means of these effects were subjected to Duncan's Multiple Range Test (1955) to determine which treatments were significantly ($P = 0.05$) different from the controls.

12. Reported Results:

(See Appendix I)

13. Study Author's Conclusions/QA Measures:

The study did not address this area except to indicate, "the chronic test generally followed the recommended bioassay procedure for fathead minnow chronic tests issued by the National Water Quality Laboratory in Duluth, Minnesota (EPA, 1971)."

14. Reviewer's Discussion and Interpretation of the Study:

- a. Test Procedures: The test procedure meet the intent of the guidelines.
- b. Statistical Analysis: The reported statistical method is acceptable. This method indicated no statistical differences. Comparison of the percentage indicate minimal differences. For example, the control survival is 80 and 90 percent for replicates A and B, respectively. The highest level tested 25.7 mg/L survival percentages were 95 and 90 for replicates A and B, respectively.

- c. This study is adequate for the registration purposes as well as hazard assessment. The highest level tested, 25.7 mg/L, did not demonstrate any adverse effects and would indicate a chemical which is no more than slightly toxic to fish, such as, the fathead minnow.
- d. Adequacy of Study:
 - 1. Classification: Core for the technical product.
 - 2. Rationale: This study meets the guideline requirements.
 - 3. Repairability: N/A
- 15. Completion of One-Liner for Study:

Completed August 1, 1985.
- 16. CBI Appendix:

N/A

Data Evaluation Record

1. Chemical: Glyphosate
2. Formulation: 93.5% Technical*
3. Citation:

Anonymous, Chronic toxicity of glyphosate to the fathead minnow (Pimephales promelas, Rafinesque), EG&G, Bionomics, Aquatic Toxicology Laboratory, 1975, Submitted by Monsanto Company, St. Louis, Missouri for Registration No. 524-308, petition numbers 9F2163 and 9H5204, accession number 017759.

4. Reviewed by

Name Dennis J. McLane
Title Biologist
Organization EEB/HED

Signature
Date:

Dennis J. McLane
8-8-79

5. Test Type

Fish life-cycle test

6. Conclusion

The study is scientifically sound and the maximum acceptable toxicant concentration (MATC) of glyphosate and fathead minnows is estimated to be > 25.7 mg/l. The study fulfills the requirement for a chronic fish study and is acceptable as "core."

7. Materials and Methods

A. Fathead minnows (Pimephales promelas, Rafinesque) were continuously exposed to five concentration of glyphosate ranging between 0.7 and 25.7 mg/l. Observations were made on the survival, growth and egg production of first generation fish, and on hatchability, survival and growth of second generation eggs and fry. Protocol followed that recommended by USEPA (1975).

B. Statistical Analysis

Measured biological parameters from duplicate aquaria during chronic exposure were averaged and means subjected to analysis of variance according to Steel and Torrie (1960). When treatment effects were indicated, the means of these effects were subjected to Duncan's Multiple Range test (1955) to determine which treatments were significantly ($P = 0.05$) different from the controls.

8. Reported Results

No significant ($P = 0.05$) effects on any of the parameters measured were observed during 255 days continuous exposure to concentrations of glyphosate as high as 25.7 mg/l. Based on these observations the maximum acceptable toxicant concentration (MATC) of glyphosate and fathead minnow is estimated to be > 25.7 mg/l.

9. Discussion

The study followed the "Recommended Bioassay Procedure for Fathead Minnow Pimephales promelas Rafinesque Chronic Tests," revised January 1972 approved by the Committee on Aquatic Bioassays, National Water Quality Laboratory, (NWQL). However, there were a few differences; the only one of concern was the change to 16-hour photoperiod instead of the Evansville, Indiana, photoperiod suggested. Fortunately, this change did not effect the spawning or egg production.

* As per a telephone conversation on May 21, 1979 with Dr. Earl Spurrier of Monsanto Co.

RECORD OF COMMUNICATION	☒ PHONE CALL ☐ DISCUSSION ☐ FIELD TRIP ☐ CONFERENCE ☐ OTHER (SPECIFY)	
(Record of item checked above)		
TO: Dr. H. O. Sanders, USDI, FWS Columbia National Fishery Research Laboratory Columbia, MO 65201	FROM:	DATE November 12, 1980 TIME
SUBJECT 8-276-3201		
SUMMARY OF COMMUNICATION Requested the slope for the tests in Folmar's paper. The following information was received: Fathead minnows LC₅₀ 1.0 ppm for the surfactant - has a slope of 1.3%. Rainbow trout .5g LC₅₀ 1.3 ppm for Roundup - has a slope of 1.37.		
CONCLUSIONS, ACTION TAKEN OR REQUIRED		
FORMATION COPIES		