DATA EVALUATION RECORD

9-9-85

1. Chemical: Glyphosate S #103601

2. Test Material: Technical - 83%

3. Study Type: Anas platyrhynchos One-Generation Reproduction Study

4. Study ID: Beavers, J.B. and Fink, R. (1978) One-Generation Reproduction Study - Bobwhite quail, Technical Glyphosate, Final Report, Project No. 139-141, Wildlife International Ltd. Submitted by Monsanto Agricultural Products Co. on November 13, 1978, for EPA Registration No. 524-308, CDL Accession No. 235924.

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 is scientifically sound and meets guideline requirements. No statistical significant reproductive impairment was found at any level.

8. Recommendation:

N/A

9. Background:

The first validation of this study was on July 3, 1979, by D. McLane. The present review is the result of the glyphosate Registration Standard.

10. Discussion of Individual Tests:

N/A

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11. Material and Methods: (Definitive Test)

a. Test Produdure: Body weights were taken four times: at initiation, after 5 weeks, prior to onset of egg laying, and at termination of the study. Food consumption was recorded biweekly. Eggs were cleaned at weekly intervals and placed in an incubator. Eggs were candled on days 0, 14, and 21. On days 22 or 23 the eggs were placed in a hatcher, on days 26 or 27 of incubation, hatchlings was housed according to the appropriate parental grouping and maintained on control diet until 14 days of age. For purposes of egg weight and eggshell thickness one egg from each pen was randomly selected on a weekly basis.

b. Design: (excerpted from citation)

Group No.	Dosage Levels	No. of Pens	Birds per Pen Drakes	Hens
1. Controls	0	5	5	2
2. Glyphosate Technical	50	5	5	2
3. Glyphosate Technical	200	5	5	2
4. Glyphosate Technical	1000	5	5	2

c. Statistics: The author indicated the student's t-test was selected to evaluate the differences.

12. Reported Results: (excerpted from citation)

Mature mallard ducks were fed dietary levels of glyphosate technical at concentrations of 50 ppm, 200 ppm, and 1000 ppm for a period of 17 weeks.

Mallard ducks receiving Glyphosate Technical at dietary concentrations of 50 ppm, 200 ppm, and 1000 ppm showed no symptoms of toxicity or behavioral abnormalities for the duration of the study. Mortalities occurred as follows: Control group, no mortalities; 50 ppm group, no mortalities; 200 ppm group, no mortalities; 1000 ppm group, one hen - week 12. Since this mortality occurred during the stress of egg production and no gross abnormalities were noted upon gross necropsy, this death was considered incidental, and not compound related. With the exception of the above, all test and control birds appeared normal throughout the study.

Evaluation of the reproductive data in tables 1A, 1B, 2A, 2B, 3A, 3B, and 4 and statistical analysis of the reproductive parameters: egg laid, eggs cracked, viable embryos, live 3-week embryos, normal hatchlings, 14-day-old survivors, representative hatchlings body weight, representative 14-day-old survivors body weight, egg weight, and eggshell thickness, demonstrate that Glyphosate Technical caused no reproductive impairment at the dose levels tested.

13. Study Author's Conclusion/QA Measures:

No further statements concerning results or quality assurance measures were made.

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

a. Test Procedures: The following items did not meet the guideline requirements:

1. Duration of the treated diet prior to egg laying was 9 weeks rather than 10 weeks.

2. The percentage of the test diet which was corn oil was not reported.

3. The body weights were taken in weeks 0, 6, 8 rather than biweekly (0, 2, 4, 6, and 8 weeks).

4. This study was outdoors rather than indoors where the testing environment can be controlled.

b. Statistical Analysis: The EEB Bigbird ANOVA/Arc-Sin ANOVA program did not indicate any statistically significant reproductive impairment for eggs laid, eggs set, viable embryos, live embryos, and normal hatchlings.

c. Discussion/Results: The study meets the intent of the guideline for technical glyphosate.

d. Adequacy of Study:

1. Category: Core for the Glyphosate Technical.

2. Rationale: The intent of the guideline testing requirement has been met.

3. Repairability: N/A

15. Completion of One-Liner for Study:

Completed August 16, 1985.

16. CBI Appendix:

N/A

Table 1A

REPRODUCTIVE DATA - MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
Eggs laid	712	582	697	728
Eggs cracked	22	28	34	46
Eggs set	652	515	625	643
Viable embryos	587	478	531	552
Live 3-week embryos	564	446	503	526
Normal hatchlings	418	360	385	425
14-Day-old survivors	406	356	376	410

Table 1B

REPRODUCTIVE SUCCESS DATA - MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
Eggs laid per hen in 8-weeks*	28	23	28	29
Eggs cracked of eggs laid (%)	3	5	5	6
Viable embryos of eggs set	90	93	85	86
Live 3-week embryos of viable embryos (%)	96	93	95	95
Normal hatchlings of live 3-week embryos (%)	74	77	77	81
14-Day-old survivors of normal hatchlings (%)	97	99	98	96
14-Day-old survivors per hen*	16	14	15	16

*Based on 25 hens

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Table 2A

EGG WEIGHT DATA - MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
No. of eggs analyzed	38	38	38	39
Mean egg weight (g)	57.5	58.3	56.3	58.9

Table 2B

EGGSHELL THICKNESS DATA - MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
No. of Eggs Analyzed	38	38	38	39
Mean Shell Thickness (mm)	0.394	0.375	0.372	0.375

Table 3A

BODY WEIGHT DATA - REPRESENTATIVE HATCHLINGS - MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
No. of ducklings analyzed	72	73	72	73
Mean body weight (g)	33	33	32	34

Table 3B

BODY WEIGHT DATA - REPRESENTATIVE 14-DAY-OLD SURVIVORS

MALLARD DUCK

	Glyphosate Technical (ppm)			
	Controls	50	200	1000
No. of ducklings analyzed	72	72	72	72
Mean body weight (g)	217	206	208	205

Table 4

BODY WEIGHT AND FOOD CONSUMPTION DATA - ADULT MALLARD DUCK

	Glyphosate Technical (ppm)							
	Controls		50		200		1000	
Week	B.W.	F.C.	B.W.	F.C.	B.W.	F.C.	B.W.	F.C.
0	1071	-	1009	-	1049	-	1083	-
2	-	98	-	59	-	79	-	117
4	-	130	-	124	-	139	-	143
6	1136	131	1047	104	1109	130	1137	143
8	1225	150	1146	132	1216	152	1257	155
10	-	155	-	132	-	141	-	154
12	-	111	-	122	-	107	-	126
14	-	138	-	135	-	149	-	158
16	1185	136	1111	142	1168	134	1168	168

The body weight data are presented as a group mean. The food consumption data are presented as the group mean feed consumed per bird per day.

B.W. - Body weight in grams.
F.C. - Food Consumption/bird/day in grams.

ATTACHMENT I

REPRODUCTIVE DATA BY PEN - MALLARD

GLYPHOSATE TECHNICAL

	Eggs Laid	Eggs Cracked	Eggs Set	Viable Embryos	Live Three-Week Embryos	Normal Hatchlings
	129	5	116	109	105	78
	93	1	84	67	66	49
Controls	165	3	156	144	136	103
	151	6	137	119	115	83
	174	7	159	148	142	105
Totals	712	22	652	587	564	418
	139	5	126	113	105	77
	137	2	128	122	113	95
	66	1	57	55	51	39
50 ppm	61	10	113	102	95	81
	109	10	91	86	82	68
Totals	582	28	515	478	446	360
	95	2	87	68	63	33
	146	10	128	114	107	86
200 ppm	142	6	128	81	80	67
	185	7	170	160	150	117
	129	9	112	108	103	82
Totals	697	34	625	531	503	385
	130	11	111	88	83	76
	166	11	147	131	130	103
1000 ppm	144	4	132	112	106	79
	114	5	102	92	90	73
	174	15	151	129	117	94
Totals	728	46	643	552	526	425

ATTACHMENT I

EGG WEIGHT DATA (g) - BY PEN - MALLARD DUCK

GLYPHOSATE TECHNICAL

						Average
Controls	59.4	57.4	56.7	56.7	57.1	57.5
50 ppm	55.5	55.2	58.0	63.1	59.7	58.3
200 ppm	56.4	56.4	53 0	59.2	56.6	56.3
1000 ppm	60.6	58.3	56.4	62.3	56.9	58.9

EGG SHELL THICKNESS DATA BY PEN - MALLARD DUCK

GLYPHOSATE TECHNICAL

(Thickness Measured in Millimeters)

						Average
Controls	0.383	0.423	0.408	0.383	0.374	0.394
50 ppm	0.371	0.371	0.369	0.368	0.394	0.375
200 ppm	0.386	0.38	0.369	0.364	0.361	0.372
1000 ppm	0.378	0.369	0.366	0.398	0.366	0.375

ATTACHMENT I

BODY WEIGHT (g) - (BY WEEK) -

REPRESENTATIVE HATCHLINGS - MALLARD DUCK

GLYPHOSATE TECHNICAL

Week #	1	2	3	4	5	6	7	8	Average
Controls	34	30	30	35	35	33	33	35	33
50 ppm	33	31	28	36	37	36	34	33	33
200 ppm	31	30	30	32	35	34	32	34	32
1000 ppm	37	32	32	35	38	32	33	35	34

14-DAY-OLD SURVIVORS - BY WEEK

MALLARD DUCK

GLYPHOSATE TECHNICAL

Week	1	2	3	4	5	6	7	8	Totals
Controls	2	24	36	74	62	77	78	53	406
50 ppm	2	14	20	52	56	66	83	63	356
200 ppm	2	18	36	66	74	52	63	65	376
1000 ppm	3	20	43	52	78	72	58	84	410

ATTACHMENT I

BODY WEIGHT DATA (g) - BY WEEK -

REPRESENTATIVE 14 DAY-OLD SURVIVORS -

MALLARD DUCK

GLYPHOSATE TECHNICAL

Week #	1	2	3	4	5	6	7	8	Average
Controls	282	189	199	214	209	213	218	216	217
50 ppm	204	197	201	221	205	210	202	207	206
200 ppm	199	186	212	204	197	200	218	206	208
1000 ppm	197	206	202	200	214	211	202	208	205

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Data Evaluation Record

1. Chemical Glyphosate

2. Formulation

Technical, 83% active ingredient

3. Citation

Beavers, J.B., R. Fink, unpublished, One-Generation reproduction study - mallard duck glyphosate technical Final Report, Wildlife International LTD. for Monsanto Agricultural Products Co. (1978) Acc. No. 235924.

4. Reviewed by

Name	Dennis J. McLane	Signature Dennis J McLane
Title	Biologist	Date: 7-3-79
Organization	EEB/HED	

5. Test Type

Avian Reproduction (Waterfowl)

6. Conclusion

The study is scientifically sound and revealed no toxicological effects at the levels tested. The study does fulfill the requirement for a waterfowl avain reproduction study and is acceptable as core data.

7. Materials and Methods

A. Three test levels, 50, 200, 1000 ppm and one control level were established. Protocol followed that recommended by USEPA (1978).

B. Statistical Analysis
The ANOVA statistical method was used to verify the comparisions for eggs cracked, egg sets, eggs laid, viable embryos, live three week embryos, and normal hatchlings. No significant parameters were found which is in agreement with the author's result.

8. Reported Results

Mallard ducks receiving glyphosate technical showed no symptoms of toxicity or behavioral abnormalities for duration of the study. One mortality (hen) was reported at the 1000 ppm level. The death occurred during the stress of egg production and gross abnormalities were noted upon gross necropsy.

9. Discussion

Only two portions of the study vary significantly from the EPA protocol (1978). The number of eggs per hen was below the protocol range (28 eggs) only 23 eggs were produced. However, both were found at the 50 ppm dosage level, and do not appear at the higher levels nor are they statistically significant when compared to the control by the ANOVA method.