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APPENDICES

Appendix A

Lethality of *Macrobrachium rosenbergii* exposed to different concentrations of TBTO

Table A1 Lethality at 24, 48, 72, and 96 h for 3 day-old *Macrobrachium rosenbergii* embryos exposed to different concentrations of TBTO (2nd range finding test)

Duration	TBTO ($\mu g\ l^{-1}$)					
(h)	SC	25	50	100	200	400
24	0, 0, 0	-	-	-	-	0, 0, 0
48	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	3, 4, 4	4, 7, 10
72	0, 0, 0	0, 0, 0	0, 0, 0	0, 0, 0	4, 4, 6	6, 8, -
96	0, 0, 0	0, 0, 0	0, 0, 0	2, 3, 0	4, 4, 6	8, 9, -

n = 10 embryos per treatment; SC, solvent control; -, not determined
The value of each replicate was separated with comma

Table A2 Lethality at 24, 48, 72, and 96 h for 3 day-old *Macrobrachium rosenbergii* embryos exposed to different concentrations of TBTO (3rd range finding test)

Duration	TBTO ($\mu g\ l^{-1}$)					
(h)	SC	200	250	300	350	400
24	2, 1, 1	0, 1, 0	5, 2, 1	0, 1, 0	1, 1, 2	1, 3, 0
48	2, 2, 3	1, 3, 0	5, 5, 1	1, 2, 0	6, 1, 2	3, 3, 0
72	2, 2, 3	1, 4, 4	5, 5, 1	1, 2, 0	6, 1, 2	4, 3, 0
96	2, 2, 2	-	-	-	-	5, 3, 2

n = 10 embryos per treatment; SC, solvent control; -, not determined
The value of each replicate was separated with comma

Table A3 Lethality at 24, 48, 72, and 96 h for 10 day-old *Macrobrachium rosenbergii* embryos exposed to different concentrations of TBTO (4th range finding test)

Duration	TBTO ($\mu g\ l^{-1}$)			
(h)	SC	500	1000	5000
24	0, 0, 0	7, 4, 5	6, 7, 7	10, 10, 10
48	0, 1, 0	8, 7, 5	10, 7, 7	-
72	0, 1, 0	9, 10, 7	-, 8, 9	-
96	0, 1, 1	9, -, 8	-, 10, 10	-

n = 10 embryos per treatment; SC, solvent control; - terminated replicate(s)
The value of each replicate was separated with comma

Table A4 Lethality at 24, 48, 72, and 96 h for *Macrobrachium rosenbergii* embryos exposed to different concentrations of TBTO

Stages	Duration	TBTO ($\mu g\ l^{-1}$)					
	(h)	SC	250	350	500	700	1000
Early (d1-5) $n = 15$	96	1, 1, 0	3, 0 ,1	3, 1, 7	8, 0, 1	0, 4, 10	15, 15, 15
Late(d12-16)$n = 12$	24	0, 0, 0	0, 0, 0	0, 0, 1	1, 1, 3	1, 1, 3	1, 0, 0
	48	0, 0, 0	2, 0, 0	2, 1, 1	3, 5, 3	3, 5, 4	4, 4, 5
	72	0, 0, 0	3, 1, 0	5, 2, 2	4, 3 , 3	4, 5, 4	4, 5, 8
	96	0, 0, 0	3, 1, 0	9, 5, 4	4, 6, 5	5, 7, 6	6, 7, 8

C, control; SC, solvent control

The value of each replicate was separated with comma

Table A5 Lethality at 24, 48, and 72 h for 4th-stage *Macrobrachium rosenbergii* larvae exposed to different concentrations of TBTO (first trial)

Duration	TBTO ($\mu g\ l^{-1}$)												
(h)	C	SC	0.1	0.2	0.4	0.8	1.5	3	6	12	24	48	96
24	0, 0, 0	0, 1, 0,	0, 0, 0	1, 3, 0	2, 4, 4	1, 6, 0	3, 0, 1	2, 1, 2	4, 2, 5	6, 5, 5	6, 7 ,7	9, 9, 0	10, 10, 10
48	3, 0, 1	0, 1, 0	0, 0, 2	5, 4, 6	3, 6, 0	3, 6, 0	4, 4, 2	2, 1, 2	7, 4, 8	7, 9, 6	9, 7, 10	9, 10, 10	-
72	3, 0, 1	0, 3, 2	6, 3, 3	8, 5, 8	8, 5, 8	3, 6, 1	4, 10, 6	3, 4, 10	10, 10, 9	10, 10, 10	10, 10, 10	10, 10, 10	-

C, control; SC, solvent control; -, terminated replicated(s)

The value of each replicate was separated with comma

Table A6 Lethality at 24 and 48 h for 1st, 2nd, and 6th-stage *Macrobrachium rosenbergii* larvae exposed to different concentrations of TBTO (second trial)

Stages	Duration	TBTO ($\mu g\ l^{-1}$)						
	(h)	C	SC	3	6	12	24	48
1	24	0, 0, 0	2, 1, 0	0, 1, 0	0, 1, 1	0, 1, 2	2, 1, 3	4, 2, 3
	48	5, 4, 0	2, 3, 2	2, 4, 1	10, 2, 1	8, 10, 10	10, 10, 10	10, 10, 10
2	24	0, 1, 0	1, 0, 0	0, 0, 0	1, 0, 0	0, 0, 1	1, 2, 1	3, 10, 1
	48	0, 1, 0	1, 1, 0	3, 3, 3	9, 1, 2	8, 7, 10	10, 9, 10	10, -, 10
6	24	0, 0, 0	0, 0, 0	0, 0, 0	3, 6, 2	10, 8, 4	10, 9, 10	10, 10, 10
	48	0, 4, 0	0, 0, 0	0, 2, 1	10, 10 ,9	-, 10, 9	-, 10, -	-

C, control; SC, solvent control; terminated replicated(s)

The value of each replicate was separated with comma

Table A7 Lethality at 24 h for 1st- to 8th-stage and 48 h for 2nd- to 6th-stage *Macrobrachium rosenbergii* larvae exposed to different concentrations of TBTO (actual tests)

Stage	Duration	TBTO ($\mu g\ l^{-1}$)											
	(h)	SC	3	4	6	9	12	14	20	24	30	45	48
1	24	0, 0, 0	-	-	-	2, 0, 3	-	3, 7, 10	8, 10, 5	-	5, 9, 0	10, 10, 10	-
2	24	0, 0, 0	-	-	1, 2, 1	1, 4, 3	-	5, 3, 4	10, 8, 4	-	8, 9, 10	-	-
	48	0, 0, 0	-	-	6, 6, 6	5, 7, 6	-	8, 5, 9	10, 10, 9	-	10, 10, 10	-	-
3	24	0, 0, 0	-	2, 2, 6	2, 2, 3	4, 6, 5	-	1, 5, 10	4, 9, 8	-	-	-	-
	48	0, 0, 0	-	5, 4, 7	6, 3, 3	5, 6, 8	-	5, 8, -	6, 10, 10	-	-	-	-
4*	24	0, 0, 0	2, 1, 2	-	4, 2, 5	-	6, 5, 5	-	-	6, 7, 7	-	-	9, 9, 9
	48	0, 0, 0	2, 1, 1	-	3, 6, 7	-	5, 7, 9	-	-	10, 9, 9	-	-	-
5	24	0, 0, 0	-	0, 0, 2	0, 1, 1	2, 1, 1	-	3, 0, 5	5, 3, 1	-	-	-	-
	48	0, 0, 0	-	3, 4, 3	6, 7, 6	6, 6, 7	-	10, 9, 9	8, 8, 6	-	-	-	-
6*	24	0, 0, 0	-	1, 0, 1	3, 2, 0	5, 3, 3	-	3, 5, 5	9, 7, 3	-	-	-	-
	48	0, 0, 0	0, 0, 0	-	3, 6, 2	-	10, 8, 4	-	-	10, 9, 10	-	-	10, 10, 10
7	24	0, 0, 0	-	-	0, 0, 0	8, 3, 3	-	9, 7, 9	10, 10, 10	-	10, 10, 10	-	-
8	24	0, 0, 0	-	-	0, 0, 0	3, 1, 0	-	5 ,8, 3	9, 10, 5	-	10, 10, 10	-	-

*24- and 48 h toxicity tests were separately conducted

n = 10 larvae per treatment; SC, solvent control; -, not tested or terminated replicate(s)

The value of each replicate was separated with comma, the underlined values were excluded before mean calculation

Appendix B

Probit Analysis

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING LC/EC VALUES
Version 1.5

Probit analysis at 24 h of 1st stage *Macrobrachium rposenbergii* larvae exposed to different concentrations of TBTO

Conc	Number Exposed	Observed Number Resp.	Proportion Responding	Proportion Responding Adjusted for Controls	Predicted Proportion Responding
9 0000	10	3	0 2500	0 2500	0.3415
14 0000	10	9	0 8500	0.8500	0.7045
20 0000	10	9	0 9000	0 9000	0.9033
30 0000	10	10	0 9500	0 9500	0 9850
45 0000	10	10	1 0000	1 0000	0.9988

Chi - Square for Heterogeneity (calculated) = 2.226
Chi - Square for Heterogeneity
(tabular value at 0.05 level) = 7.815

Mu = 1.037120
Sigma = 0.202879

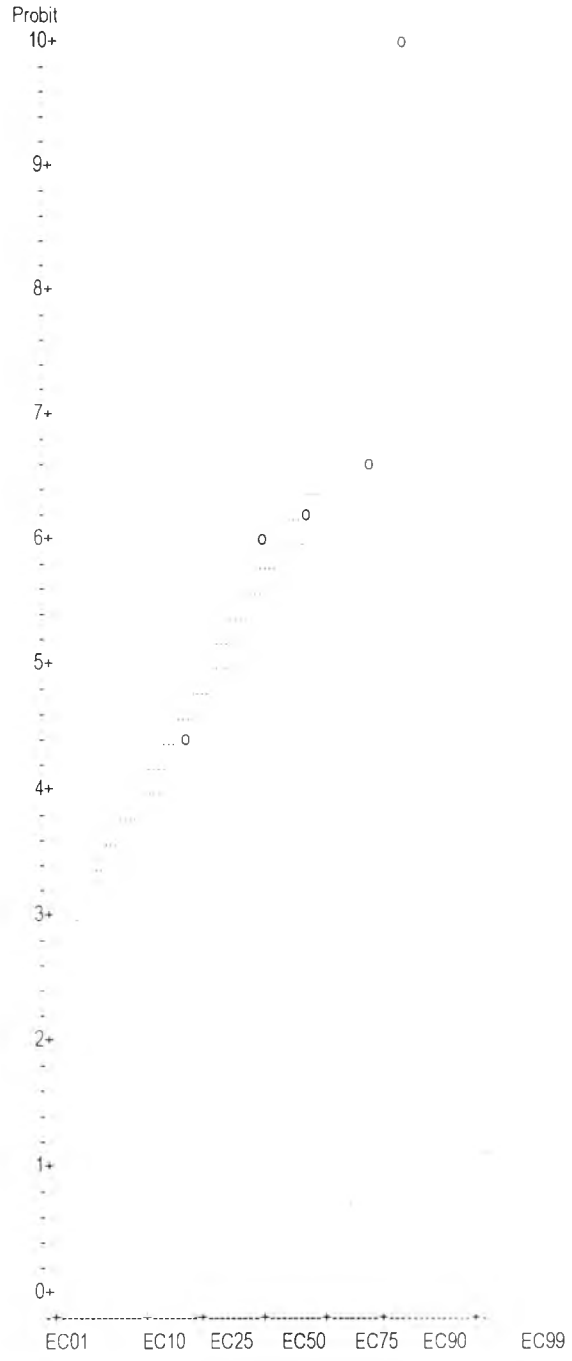
Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	-0.112013	1.727237	(-3.497398, 3.273371)
Slope	4 929048	1.510924	(1.967637, 7.890458)

Theoretical Spontaneous Response Rate = 0.0000

Estimated LC/EC Values and Confidence Limits

Point	Exposure Conc.	95% Confidence Limits Lower	Upper
LC/EC 1 00	3 674	0 500	6 192
LC/EC 5.00	5.051	1 099	7 631
LC/EC 10.00	5.986	1 667	8.556
LC/EC 15.00	6.712	2 204	9.261
LC/EC 50.00	10 892	6 790	13.678
LC/EC 85.00	17.676	14 061	30.057
LC/EC 90.00	19.821	15 552	38.891
LC/EC 95.00	23.487	17.750	57.959
LC/EC 99.00	32 291	22 201	125.494

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



Biography

Mr. Pornriddh Ariyavongvadhana was born on October 30th, 1972 in Bangkok. He graduated the Bachelor of Science in Marine Science from Chulalongkorn University in academic year 1994. He worked in an environmental consultant company for 3 years beore starting his post-graduation in acdemic year 1998.