

TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF FIGURES	iii
LIST OF TABLES	ix
LIST OF APPENDIX TABLES	xii
ABSTRACT	1
GENERAL INTRODUCTION	2
CHAPTER 1 LARVAL REARING, CULTURE AND GROWTH OF JUVENILES USING LOCALLY AVAILABLE FOODS	18
1.1 Introduction	18
1.2 Materials and Methods	21
1.3 Results	34
CHAPTER 2 BIOLOGY OF ADULT PRAWN IN SRI LANKA	83
2.1 Introduction	83
2.2 Materials and Methods	84
2.3 Results	89
CHAPTER 3 FISHERY OF <u>Macrobrachium rosenbergii</u> IN SRI LANKA	157
3.1 Introduction	157
3.2 Materials and Methods	158
3.3 Results	158
DISCUSSION	218
REFERENCES	247
APPENDIX TABLES	258

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. The geographical distribution of <u>Macrobrachium rosenbergii</u>	17
1.1 The sampling areas in the present study	33
1.2 The recirculating tank system for rearing larvae of <u>M. rosenbergii</u>	45
1.3 The relationship between age (days) and the total body length of <u>M. rosenbergii</u> larvae	46
1.4 The relationship between total body length and the carapace length of <u>M. rosenbergii</u> larvae	47
1.5 The fertilized eggs of <u>M. rosenbergii</u>	48
1.6 The segmentation of eggs of <u>M. rosenbergii</u>	49
1.7 The 18-19 days old eggs of <u>M. rosenbergii</u> (eggs ready to hatch)	50
1.8 The first larval stage of <u>M. rosenbergii</u>	51
1.9 The second larval stage of <u>M. rosenbergii</u>	52
1.10 The third larval stage of <u>M. rosenbergii</u>	53
1.11 The fourth larval stage of <u>M. rosenbergii</u>	54
1.12 The fifth larval stage of <u>M. rosenbergii</u>	55
1.13 The sixth larval stage of <u>M. rosenbergii</u>	56
1.14 The seventh larval stage of <u>M. rosenbergii</u>	57
1.15 The eighth larval stage of <u>M. rosenbergii</u>	58
1.16 The ninth larval stage of <u>M. rosenbergii</u>	59
1.17 The tenth larval stage of <u>M. rosenbergii</u>	60
1.18 The eleventh larval stage of <u>M. rosenbergii</u>	61
1.19 The mean dissolved oxygen (mg/l) in the recirculating tanks during larval development	62
1.20 The mean temperature (C°) in the recirculating tanks during larval development	63
1.21 The survival rate and stocking density of <u>M. rosenbergii</u> larvae in recirculating tank system	69

1.22	The yield and stocking density of <u>M. rosenbergii</u> larvae in recirculating tank system . . .	70
1.23	The relationship between age (days) and the average body weight of <u>M. rosenbergii</u> juveniles reared in P ₁ and P ₂ and the late juveniles in P ₃ . . .	78
1.24	The relationship between age (days) and the log-length of <u>M. rosenbergii</u> juveniles reared in P ₁ and P ₂ and the late juveniles in P ₃ . . .	79
1.25	The survival rate of juveniles reared in P ₁ during the experimental period . . .	80
1.26	The survival rate of juveniles reared in P ₂ during the experimental period . . .	81
1.27	The survival rate of late juveniles reared in P ₃ during the experimental period . . .	82
2.1	The dorsal view of male <u>M. rosenbergii</u> . . .	116
2.2	The lateral view of male <u>M. rosenbergii</u> . . .	117
2.3	The relationship between total body length and the body weight of males and females of <u>M. rosenbergii</u> . . .	118
2.4	The relationship between log-body length and the log-weight of males and females of <u>M. rosenbergii</u> . . .	119
2.5	The relationship between total body length and the length of second thoracic appendage of males and females of <u>M. rosenbergii</u> . . .	120
2.6	The relationship between total body length and the length of second thoracic chelae of males and females of <u>M. rosenbergii</u> . . .	121
2.7	The relationship between total body length and the length of first thoracic appendage of males and females of <u>M. rosenbergii</u> . . .	122
2.8	The relationship between total body length and the length of first thoracic distal segment of males and females of <u>M. rosenbergii</u> . . .	123
2.9	The relationship between total body length and the length of antennal scale of males and females of <u>M. rosenbergii</u> . . .	124
2.10	The relationship between total body length and the width of cephalothorax of males and females of <u>M. rosenbergii</u> . . .	125

2.11	The relationship between total body length and the maximum width of first abdominal pleura of males and females of <u>M. rosenbergii</u>	. . . . .	126
2.12	The relationship between total body length and the maximum width of telson of males and females of <u>M. rosenbergii</u>	. . . . .	127
2.13	The relationship between total body length and the length of rostrum of males and females of <u>M. rosenbergii</u>	. . . . .	128
2.14	The relationship between total body length and the length of cephalothorax of males and females of <u>M. rosenbergii</u>	. . . . .	129
2.15	The relationship between total body length and the length of abdomen of males and females of <u>M. rosenbergii</u>	. . . . .	130
2.16	The relationship between total body length and the length of telson of males and females of <u>M. rosenbergii</u>	. . . . .	131
2.17	The relationship between total body length and the number of ventral serrations of males and females of <u>M. rosenbergii</u>	. . . . .	132
2.18	The relationship between total body length and the number of dorsal serrations anterior to beginning of orbit of males and females of <u>M. rosenbergii</u>	. . . . .	133
2.19	The monthly shifting of model length of <u>M. rosenbergii</u> at the Panadura area in 1980	. . . . .	136
2.20	The main food items of different length groups of <u>M. rosenbergii</u> caught from the Panadura area in 1980	. . . . .	141
2.21	The main food items of different length groups of <u>M. rosenbergii</u> caught from the Katunayake area in 1980	. . . . .	142
2.22	The main food items of different length groups of <u>M. rosenbergii</u> caught from the Chilaw area in 1980.	. . . . .	143
2.23	The relationship between total body length and the fecundity of <u>M. rosenbergii</u>	. . . . .	151
2.24	The relationship between carapace length and the fecundity of <u>M. rosenbergii</u>	. . . . .	152
2.25	The relationship between body weight and the fecundity of <u>M. rosenbergii</u>	. . . . .	153

2.26	The relationship between weight of gonads and the fecundity of <u>M. rosenbergii</u>	. . . .	154
2.27	The relationship between egg diameter distribution of length groups and the % frequency of <u>M. rosenbergii</u>	. . . .	155
2.28	The observation areas and the main fishing areas of <u>M. rosenbergii</u> in the Negombo-Katunayake region	. . . .	156
3.1	The total catch of males and females of <u>M. rosenbergii</u> at three fishing areas in 1980	. . . .	160
3.2	The effect of seasonal changes on the % body weight of <u>M. rosenbergii</u> at three different areas in 1980	. . . .	161
3.3	The effect of seasonal changes on the % number of <u>M. rosenbergii</u> at three different areas in 1980	. . . .	162
3.4	The relationship between the total catch of <u>M. rosenbergii</u> and the rainfall at the Panadura area in 1980	. . . .	166
3.5	The relationship between the total catch of <u>M. rosenbergii</u> and the rainfall at the Katunayake area in 1980	. . . .	167
3.6	The relationship between the total catch of <u>M. rosenbergii</u> and the rainfall at the Chilaw area in 1980	. . . .	168
3.7	The variation in the percentage distribution of males and females of <u>M. rosenbergii</u> with the rainfall at the Panadura area in 1980	. . . .	169
3.8	The variation in the percentage distribution of males and females of <u>M. rosenbergii</u> with the rainfall at the Katunayake area in 1980	. . . .	170
3.9	The variation in the percentage distribution of males and females of <u>M. rosenbergii</u> with the rainfall at the Chilaw area in 1980	. . . .	171
3.10	The variation in the percentage of berried females of <u>M. rosenbergii</u> with the rainfall throughout the year at the Panadura area in 1980	. . . .	174
3.11	The variation in the percentage of berried females of <u>M. rosenbergii</u> with the rainfall throughout the year at the Katunayake area in 1980	. . . .	175

3.12	The variation in the percentage of berried females of <u>M. rosenbergii</u> with the rainfall throughout the year at the Chilaw area in 1980	176
3.13	The length distribution frequency of <u>M. rosenbergii</u> at different areas in 1980	180
3.14	The length distribution frequency of <u>M. rosenbergii</u> (males and females) at different areas in 1980	181
3.15	The monthly length distribution frequency of <u>M. rosenbergii</u> at the Panadura area in 1980	182
3.16	The monthly length distribution frequency of <u>M. rosenbergii</u> at the Katunayake area in 1980	183
3.17	The monthly length distribution frequency of <u>M. rosenbergii</u> at the Chilaw area in 1980	184
3.18	The monthly length distribution frequency of <u>M. rosenbergii</u> (males and females) at the Panadura area in 1980	185
3.19	The monthly length distribution frequency of <u>M. rosenbergii</u> (males and females) at the Katunayake area in 1980	186
3.20	The monthly length distribution frequency of <u>M. rosenbergii</u> (males and females) at the Chilaw area in 1980	187
3.21	Spears ("Mandawa")	203
3.22	Rattan pot	204
3.23	Bamboo pot	205
3.24	Cast nets ("Visidela")	206
3.25	Skimming nets ("Kadippuwa")	207
3.26	Scoop nets ("Athanguwa")	208
3.27	"Karaka trap"	209
3.28	Cone cage ("Kemana trap")	210
3.29	Fence with trap	211
3.30	"Jakotuwa trap"	212

3.31	Tidal fences	213
3.32	Brushpile method ("Masathu")	214
3.33	The buying and selling prices of <u>M. rosenbergii</u> during the period of 1980-1982	217

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1.1 The larval stages and the age range of <u>Macrobrachium rosenbergii</u> larvae	42
1.2 Correlation coefficient, regression equation, and the significance of correlation of total body length with age (days) and carapace length	43
1.3 The physical and chemical conditions of the water in the recirculating tanks	43
1.4 Types and abundance of phytoplankton in the water in recirculating tanks	44
1.5 Larval rearing data in the recirculating tanks	66
1.6 Correlation coefficient, regression equation, and the significance of correlation of stocking density (larvae/l) with % survival	67
1.7 Correlation coefficient, regression equation, and the significance of correlation of stocking density (larvae/l) with yield (post larvae/l)	68
1.8 The biochemical composition of flesh of the foot of <u>Achatina fulica</u> and 'Leybes' brand chicken feed	71
1.9 The average length and the weight of <u>M. rosenbergii</u> in ponds P ₁ , P ₂ and P ₃ during the experimental period	77
2.1 Correlation coefficient, regression equation, and the significance of correlation between log-length and log-body weight of male <u>M. rosenbergii</u>	91
2.2 Correlation coefficient, regression equation, and the significance of correlation between log-length and log-body weight of female <u>M. rosenbergii</u>	92
2.3 Correlation coefficient, regression equation, and the significance of correlation of total body length with length of second thoracic appendage and second thoracic chelae of male <u>M. rosenbergii</u>	94
2.4 Correlation coefficient, regression equation, and the significance of correlation of total body length with length of second thoracic appendage and second thoracic chelae of female <u>M. rosenbergii</u>	95

2.5	Correlation coefficient, regression equation, and the significance of correlation of total body length with length of first thoracic appendage and first thoracic distal segment of male <u>M. rosenbergii</u>	98
2.6	Correlation coefficient, regression equation, and the significance of correlation of total body length with length of first thoracic appendage and length of first thoracic distal segment of female <u>M. rosenbergii</u>	99
2.7	Correlation coefficient, regression equation, and the significance of correlation of total body length with antennal scale of male <u>M. rosenbergii</u>	101
2.8	Correlation coefficient, regression equation, and the significance of correlation of total body length with length of antennal scale of female <u>M. rosenbergii</u>	102
2.9	Correlation coefficient, regression equation, and the significance of correlation of total body length with maximum width of cephalothorax, maximum width of first abdominal pleura and maximum width of telson of male <u>M. rosenbergii</u>	105
2.10	Correlation coefficient, regression equation, and the significance of correlation of total body length with maximum width of cephalothorax, maximum width of first abdominal pleura and maximum width of telson of female <u>M. rosenbergii</u>	106
2.11	Correlation coefficient, regression equation, and the significance of correlation of total body length with length of rostrum, length of cephalothorax, length of abdomen and length of telson of male <u>M. rosenbergii</u>	110
2.12	Correlation coefficient, regression equation, and the significance of correlation of total body length with length of rostrum, length of cephalothorax, length of abdomen, and length of telson of female <u>M. rosenbergii</u>	111
2.13	Correlation coefficient, regression equation, and the significance of correlation of total body length with number of ventral serrations and number of dorsal serrations anterior to beginning of orbit of male <u>M. rosenbergii</u>	114
2.14	Correlation coefficient, regression equation, and the significance of correlation of total body length with number of ventral serrations and number of dorsal serrations anterior to beginning of orbit of female <u>M. rosenbergii</u>	115

2.15	The total length of <u>M. rosenbergii</u> at respective age groups	135
2.16	The range and mean fecundity in different age groups of <u>M. rosenbergii</u>	147
2.17	Correlation coefficient, regression equation, and the significance of correlation of fecundity with total length, carapace length, body weight, and the gonad weight of <u>M. rosenbergii</u>	148
2.18	Length groups and egg diameter distribution of <u>M. rosenbergii</u>	149
2.19	The seasonal variation of catch of berried females in brushpiles in relation to rainfall	150
3.1	The correlation, correlation coefficient, and the significance of the correlation between rainfall and the total annual catch from the Panadura, Katunayake and Chilaw areas	165
3.2	The correlation, correlation coefficient, and the significance of the correlation between rainfall and the berried females caught from the Panadura, Katunayake and Chilaw areas	173
3.3	The average buying and selling price of 1kg of <u>M. rosenbergii</u> in 1980-82	216

LIST OF APPENDIX TABLES

<u>Appendix Table</u>	<u>Page</u>
1 The preparation of water mixture for larval stages . . .	258
2 The mesh sizes for strainers for larval stages . . .	259
3 The monthly increase of mean length and the mean weight of <u>M. rosenbergii</u> juveniles reared in pond P ₁ . . .	260
4 The monthly increase of mean length and the mean weight of <u>M. rosenbergii</u> juveniles reared in pond P ₂ . . .	261
5 The monthly increase of mean length and the mean weight of <u>M. rosenbergii</u> late juveniles reared in pond P ₃ . . .	262
6 Rainfall and total annual catch in Panadura, Katunayake and Chilaw . . .	263
7 Total catch of <u>M. rosenbergii</u> at the Panadura area in 1980 . . .	264
8 Total catch of <u>M. rosenbergii</u> at the Katunayake area in 1980 . . .	265
9 Total catch of <u>M. rosenbergii</u> at the Chilaw area in 1980 . . .	266
10 The rainfall and the % frequency of berried females in Panadura, Katunayake and Chilaw . . .	267
11 The % frequency of <u>M. rosenbergii</u> belonging to different length groups in Panadura, Katunayake and Chilaw areas . . .	268
12 The % frequency of male and female prawns of different length groups in the Panadura, Katunayake and Chilaw areas . . .	269
13 Seasonal variation of prawns of different sizes in Panadura . . .	270
14 Seasonal variation of prawns of different sizes in Katunayake . . .	271
15 Seasonal variation of prawns of different sizes in Chilaw . . .	272

16	Seasonal variation of male and female prawn belonging to different length groups in Panadura . . .	273
17	Seasonal variation of male and female prawn belonging to different length groups in Katunayake . . .	274
18	Seasonal variation of male and female prawn belonging to different length groups in Chilaw . . .	275