ABBREVIATIONS

ANOVA	:	Analysis of Variance
BHIB	:	Brain heart infusion broth.
CA	:	Carbonic anhydrase
CDNB	:	1-chloro-2, 4-dinitrobenzene
cfu/ml	:	Colony forming units/milliliter
°C	:	Degree Centigrade
d	:	day
DTT	:	Dithiothreitol
EDTA	:	Ethyt diamine tetra acitic acid
FAO	:	Food and Agricultural Organization
FCR	:	Food convension ratio
g	:	gram
GPx	:	Glutathione peroxidise
GR	:	Glutathione reductase
GST	:	Glutathione-s- transferase
Kg	:	Kilograms
h	:	Hour
hop	:	Hemolymph osmotic pressure
IMTECH	:	Institute of Microbial Technology
MDA	:	Malondialdehyde
min	:	minute
ml	:	milli liter
$mOsm \cdot kgH_2O^{-1}$	:	milliosmoles/kilogram
MPEDA	:	Marine Products Export Development Authority
MRC	:	mitochondria-rich cells
MTCC	:	Micro Type Culture Collection
µl	:	Microlitre
NADPH	:	Reduced nicotinide adenine dinucleotide phasphate
µm	:	Micrometer
Nm	:	Nanometers
PCR	:	Polymarase chain reaction
Pi	:	Inorganic phosphate

PL_{15}	:	Post larvae (15 days old)
PmCA	:	*P.monodon* Carbon anhydrase
ppt	:	Parts per thousand
RT-PCR	:	Real time Polymarase chain reaction
SDS	:	Sodium dedocyl sulphate
SGR	:	Specific growth rate
SR	:	Survival rate
TBARS	:	Thiobarbituric acid reactive substances
TCBS	:	Thiosulphate Bile salts sucrose
TCA	:	Tri chloro acetic acid
TSB	:	Tripticase Soy Broth
UV	:	Ultra violet
WSSV	:	White Spot Syndrome Virus
wt.	:	Weight
w/v	:	weight/ volume
W.W	:	Wet weight

PREFACE

As fish production by capture has become stagnant world wide during the last decade, aquaculture gained importance as a means to improve food production. It has been reported that aquaculture the most rapidly growing food production sector in the world and has the potential to meet half the world's sea food demand by 2020 (Moriarty, 1999). With an annual growth rate of 30% since 2012, the production almost trebled from 13 to 38 million tons in the last 10 years (MPEDA 2013).

The black tiger shrimp *Penaeus monodon* (Fabricius) is the most widely cultured species in Asian countries including India. Late nineteen eighties and early nineties saw a spectacular rise in shrimp production in India. However, consecutive outbreaks of bacterial and viral diseases have devastated shrimp aquaculture in many Asian countries during the last few years resulting in hug economic losses. In India alone losses due to shrimp disease outbreak were put at US $ 400 million between 1993 and 1995 (MPEDA, 2000). As a result farmers started using antibiotics and antimicrobial compounds as prophylactics in large quantities even when pathogen were not evident. This has led to an increase in vibrio and presumably other bacteria, having multiple antibiotic resistance and to an increase in more virulent pathogens (Moriarty,1998).

Increased concern about antibiotics resistant microorganisms has led to suggestions of alternative disease prevention methods including the use of low salinity Although most studies concerned with the effects of low salinity on culture shrimp (or) shrimp have reported enhanced survival and growth rates (Saha *et al.*, 1999), improved resistance against disease (McNamara & Faria, 2012), increased production of osmoregulatory enzymes (Henry *et al.*, 2012), increased carbonic anhydrase gene expression (Serrano *et al.*, 2007 and Mitchell & Henry, 2014), there has been a tendency to emphasize laboratory rather than field studies. Moreover the approaches used have been narrow rather than broad based. Consequently the information content of the resultant publications is often restricted with limited value for application to the problems is often of aquaculture in field conditions. *P.monodon*, the black tiger shrimp is widely cultured both in India and other South Asian countries. However, very few studies have been carried out on the effect of salinity on survival, growth and performance of this species in field conditions.

The main objective of the present investigation is to evaluate the long term influence of low salinity on survival, growth and disease resistance of *P. monodon* cultured on semi-intensive basis in natural field conditions. Throughout the investigation the effect of low salinity on disease resistance have been studied separately and osmoregulation process in low salinity was studied simultaneously.

Chapter-I is devoted to study the influence of low salinity on osmoregulatory enzyme activities. These enzymes play important role in osmoregulation process and Carbonic anhydrase gene expression, when PLs were acclimated to different salinities. The results are presented.

Osmoregulation is energetically costly but necessary in species like penaeid shrimp. This energy was provided through Carbohydrate metabolism (Proteins, FAA, Carbohydrates, Lipids, FFA and Glycogen). The results are presented in Chapter-II.

Maintenance of salinity is most important in shrimp culture and thus can influence Growth and Survival rate. Accordingly the effect of low salinity on physiological parameters

(Like Survival rate, Specific growth rate, Weight, Moulting and Length) has been studied. Similarly the effect of low salinity on disease resistance of PLs has been examined along with PCR analysis for the White Spot Syndrome Virus (WSSV) and growth of *Vibrio harveyi* the results are presented in Chapter-III.

In general the health of an organism depend upon how effectively the immune system responds to the invasion of pathogens. This chapter devoted to study the influence of different salinity levels on antioxidant enzyme activities. The results are presented in Chapter-IV.

By undertaking this investigation I want to generate data on the influence of low salinity on growth, survival and disease resistance of *P.monodon* which could be useful for the farmers.

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