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EFFECTS OF ENVIRONMENTAL FACTORS ON VIBRIOSIS IN SEABASS (*LATES CALCARIFER BLOCH*) AT A FLOATING CAGE CULTURE FARM.

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by

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Dedicated to

nature,

it's beauty,

mysteries and

the many challenges

it poses to

science and mankind.

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LIST OF ABBREVIATIONS

*ADH - Arginine

*AMY - Amygdalin

*ARA - Arabinose

C - Carbon

CFU - Colony forming units

CIT - Citrate

D.O. - Dissolved oxygen

ECP - Extracellular products

*Gel - Kochn's Gelatin

Hrs - Hours

IM - Intramuscular

*INO - Inositol

IP - Intraperitoneal

*LDC - Lysine

MA - Marine agar

*MAN - Mannitol

*Mel - Melibiose

MR - Methyl red

t - Metric Ton

N - Nitrogen

n - Neap tide

NaCl - Sodium chloride

*ODC - Ornithine

O.D. - Optical Density

O/F - Fermentative/Oxidative test

*ONPG- Ortho-nitro-phenyl-galactoside

P - Phosphorus

PPT - Parts per thousand

PV - Presumptive vibrio counts

RHA - Rhamnose

RM - Ringgit Malaysia

s - Spring tide

SAC - Sucrose

St. - Station

SOR - Sorbitol

TBC - Total bacterial counts

TCBS - Thiosulphate citrate bile salt sucrose agar

TDA - Tryptophan

TSA - Trypticase soy agar

TSB - Typtic soy broth

URE - Urease

VP - Voges Proskeur

* Abbreviations in API strips

Terms In Statistical Analysis

Pho - Phosphate

Tc - Total Counts

Sed - Sediment

SEDG1/2 - Green colonies in sediment

SEDY1/2 - Yellow colonies in sediment

Chlo - Chlorophyll *a*

Nitri	- Nitrite
Nitra	- Nitrate
CON	- Conductivity
SAL	- Salinity
StG1/2	- Green colonies in the water column
Temp	- Temperature
Mid	- Middle of water column (6m)
Bot	- Bottom of the water column (12m)

Abstract of thesis submitted to the Senate of Universiti Pertanian Malaysia in fulfilment of the requirement for the degree of Master of Science.

THE EFFECTS OF ENVIRONMENTAL FACTORS ON VIBRIOSIS IN SEABASS (*LATES CALCARIFER* BLOCH) AT A CAGE CULTURE FARM.

By

Premala Arulampalam

April 1995

Chairman : Professor Mohamed Shariff, Ph.D

Faculty : Fisheries and Marine Science

The present study indicates that the evolution of intensive marine cage culture farms in Malaysia can be a potential risk for outbreaks of vibriosis under unfavourable environmental conditions. The cage culture farm harboured significantly higher numbers of bacteria in the sediment and underlying waters compared to the surrounding waters indicating that the farm serves as a reservoir for bacteria. This is due to the rapid build up of organic waste from feed and excretion matter from fish.

Vibrios isolated from the cage culture farm were found to be virulent to sea bass fingerling. Intraperitoneal injections of whole live bacterial cells of the chosen isolate, *Vibrio alginolyticus* caused higher mortalities compared to the extracellular products (ECP) of the bacteria. In the intramuscular injection (IM), only whole live bacterial cells of *V. alginolyticus* caused

50% mortalities when injected into sea bass fingerlings. This indicates that even though ECP plays a role in the pathogenesis of *V. alginolyticus*, whole live bacterial cells are required to maintain infection.

Fluctuations in the environment at the cage culture farm were found to influence bacterial population and distribution in the sediment and water column. However, physical parameters studied did not seem to influence bacterial population. It was observed that nutrient concentrations such as ortho-phosphate, ammonia-N, nitrate-N and nitrite-N as well as chlorophyll *a* concentrations play an active role in determining the distribution and population of bacteria in the environment throughout the year. Significant correlations were found between the nutrient concentrations and bacterial population in the environment.

Intramuscular injections of *V. alginolyticus* and its ECP caused severe pathological changes in the internal organs of *L. calcarifer* indicating that the bacteria causes systemic infection. Pathological changes were also observed at the site of injection but were less severe. Intramuscular injection of ECP caused detrimental changes faster compared to IM injections of the bacteria. In histological samples obtained from the administration of ECP, such pathological changes involved in eliminating bacteria such as nests which were observed in the heart