

This site uses cookies. By continuing to use this site you agree to our use of cookies. To find out more, see our Privacy and Cookies policy.



*NOTICE*: Due to essential maintenance there will be a brief interruption to service.

## Table of contents

Volume 236

2019

◀ Previous issue      Next issue ▶

**The 1st International Conference on Fisheries and Marine Science 6 October 2018, East Java, Indonesia**

Accepted papers received: 16 January 2019

Published online: 01 March 2019

Open all abstracts

### Preface

OPEN ACCESS

011001

The 1st International Conference on Fisheries and Marine Science

— Close abstract       View article       PDF

### Preface

It is such great a pleasure for me to welcome all of you on behalf of the Faculty of Fisheries and Marine Universitas Airlangga, for the first international conference on fisheries and marine science.

**The 1<sup>st</sup> International Conference on Fisheries and Marine Science (InCoFiMS)** is the first initiated international conference held by the Faculty of Fisheries and Marine, which beforehand was held in the National Level. This expanded level of this conference with the theme of **"Fisheries and Marine in Supporting Sustainable Development Goals (SDG's) achievement"** is expected to be capable of connecting students, lecturers, researchers, government and professionals from across the world to meet, greet, share and discuss about the potential and best practices in the field of fisheries and marine during the period of focusing on SDG's

The aims of this conference is to develop and improve the goals of Universitas Airlangga to be one of the Top 500 Universities in the world by contribute in improving aquaculture and Fisheries Sustainable sector. And for this conference we also cooperate with Scopus Indexed Publisher In order to assist students, lecturers and researchers in disseminating their findings, to publish selected papers which are expected to help societies to implement the findings in the focus on developing aquaculture and fisheries sustainable.

I strongly hope that all of participants from around the world enjoy the conference in the historical hity of Surabaya, the second biggest city in Indonesia with competitive economic activities for the future of Fisheries and Marine development.

Once again, I am most grateful for your participation and your support. Thank you.

**Dr. Woro Hastuti Satyantini**

**Chief of INCOFIMS**

<https://doi.org/10.1088/1755-1315/236/1/011001>

---

**OPEN ACCESS**

011002

Organizing Committee

+ Open abstract  View article  PDF

---

**OPEN ACCESS**

011003

Conference Photos

+ Open abstract  View article  PDF

---

**OPEN ACCESS**

011004

Peer review statement

- Close abstract  View article  PDF

All papers published in this volume of *IOP Conference Series: Earth and Environmental Science* have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.

<https://doi.org/10.1088/1755-1315/236/1/011004>

---

## Papers

---

**OPEN ACCESS**

012001

The Increase in  $\beta$ -carotene Content in *Dunaliella salina* from the Application of Different Light Intensities

N Sugiati, E D Masithah, W Tjahjaningsih and A A Abdillah

+ Open abstract  View article  PDF

---

**OPEN ACCESS**

012002

Ammonia-eliminating potential of *Gracilaria* sp. And zeolite: a preliminary study of the efficient ammonia eliminator in aquatic environment

M R Royan, M H Solim and M B Santanumurti

+ Open abstract  View article  PDF

- 
- OPEN ACCESS** 012003  
Identification of extracellular enzyme-producing bacteria (proteolytic, cellulolytic, and amylolytic) in the sediment of extensive ponds in Tanggulrejo, Gresik  
OA Artha, Sudarno, H Pramono and LA Sari  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012004  
Addition of water from the treatment pond of pangasius fillet waste (*Pangasius* sp.) with different concentrations in the cultivation medium due to the population growth of *Daphnia* sp.  
H P Alvian, E D Masithah and M H Azhar  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012005  
The growth and survival rate in lettuce aquaponic systems (*Latuca sativa*) of eels in various stocking densities of eel (*Monopterus albus*)  
N K Portalia, L Sulmartiwi and B S Rahardja  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012006  
The prevalence of benedeniasis in humpback grouper (*Cromileptes altivelis*) in floating net cages in Situbondo Regency, East Java, Indonesia  
S O Wijaya, S Subekti and Kismiyati  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012007  
The prevalence of fungi on groupers (*Epinephelus* sp.) in cage mariculture systems of the northern coast of Surabaya, East Java  
E Yuliasuti, R Kusdawarti and Sudarno  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012008  
The spectrum of light and nutrients required to increase the production of phycocyanin *Spirulina platensis*  
H A Wicaksono, W H Satyantini and E D Masithah  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012009  
The growth and survival rate of the larvae of the sunu grouper (*Plectropomus leopardus*) in different temperatures  
L Lutfiyah, D S Budi and M F Ulkhaq  
[+](#) Open abstract [View article](#) [PDF](#)

- 
- OPEN ACCESS** 012010  
Preservation of common carp (*Cyprinus carpio*) sperm using 0.9% NaCl and ringer's lactate solution  
D S Budi, L A Adawiyah and L Lutfiyah  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012011  
Comparison of the efficiency (flash point, freezing point, and viscosity test) of biodiesels from *Sargassum* sp.  
M B Santanumurti, M R Royan, S H Samara, S Sigit and M A Alamsjah  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012012  
Study of patterns in the relationship of ecdysis with the age of freshwater crayfish *Cherax quadricarinatus* aged 76 Days  
A H Fasya  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012013  
Maximum density in the *Moina macrocopa* culture able to produce parthenogenesis in female offspring  
A S Mubarak, D Jusadi, M Z Junior and M A Suprayudi  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012014  
The oxygen content and dissolved oxygen consumption level of white shrimp *Litopenaeus vannamei* in the nanobubble cultivation system  
D P Galang, A K Ashari, L Sulmantiwi, G Mahasri, Prayogo and LA Sari  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012015  
The effect of the epiphytes of *Chaetomorpha crassa* on the total chlorophyll-a and growth of *Gracilaria verrucosa*  
A L L Handayani, R J Triastuti and L Sulmantiwi  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012016  
Growth monitoring of koi fish (*Cyprinus carpio*) in natural hatchery techniques in Umbulan, Pasuruan, East Java  
F P Putri and N N Dewi  
[+](#) Open abstract [View article](#) [PDF](#)

- 
- OPEN ACCESS** 012017  
Dynamic Ratio Correlation of N:P in relation to the Diatom Abundance in the Intensive System of the Vannamei (*Litopenaeus vannamei*) Shrimp Pond  
E D Masithah, D D Nindarwi, T Rahma and dan R R Satrya P I  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012018  
Dynamic ratio correlation of N:P on the abundance of Bluegreen algae in an intensive system in a white shrimp (*Litopenaeous vannamei*) pond  
E D Masithah, D D Nindarwi, A L A Suyoso and D Husin  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012019  
Dynamic ratio correlation of N:P toward phytoplankton explosions in intensive systems of white shrimp pond  
E D Masithah, D D Nindarwi, D Husin and T Rahma  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012020  
Development of water and nutrient management models to improve multitrophic seafarming productivity  
J A Surbakti, I A L Dewi, M A Alamsjah and M Lamid  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012021  
Pond soil characteristic in reclaimed tidal lowlands and its correlation with the water quality for aquaculture  
M Fitriani, I Wudtisin, M Kaewnern and R H Susanto  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012022  
The dynamics of total organic matter (tom) on sangkuriang catfish (*clarias gariepinus*) farming at upt ptpbp2kp and the effectiveness of freshwater bivalve (*anodonta woodiana*) in reducing the total organic matter with varying density  
D Arfiati, C D G Putra, A H Tullah, S W A Permanasari and A W Puspitasari  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012023  
Growth and morphological changes in relation to the maturation of male Japanese eel, *Anguilla japonica* injected with human chorionic gonadotrophin (HCG) in the different interval in the tropical region  
Y T Hee, F F Ching and S Senoo  
[+](#) Open abstract [View article](#) [PDF](#)

- 
- OPEN ACCESS** 012024  
Genetic diversity of the endangered species *Sphyrna lewini* (Griffith and Smith 1834) in Lombok based on mitochondrial DNA  
S Hadi, N P Angraini, E Muttaqin, B M Simeon, B Subhan and H Madduppa  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012025  
Sex ratio and size at first maturity of razor clam *Solen* sp. in Pamekasan and Surabaya coastal area, East Java, Indonesia  
N Trisyani, N I Wijaya and I Yuniar  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012026  
Improving productivity and water quality of catfish, *Clarias* sp. cultured in an aquaponic ebb-tide system using different filtration  
E Setiadi, I Taufik, Y R Widyastuti, I Ardi and D Puspaningsih  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012027  
Different substrate of trickling filter on growth, survival rate, and water quality of common carp (*Cyprinus carpio*) cultivation by using an intensive recirculation system  
E Setiadi, I Taufik, Y R Widyastuti, I Ardi and A Saputra  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012028  
Water quality dynamic, production and profitability of catfish, *Clarias* sp. cultured at different design construction of aquaponic  
Y R Widyastuti, E Setiadi, I Taufik and L Setijaningsih  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012029  
Effect of C:N ratio on the spore production of *Bacillus* sp. indigenous shrimp pond  
A Yuniarti, N B Arifin, M Fakhri and A M Hariati  
[+](#) [Open abstract](#) [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012030  
Comparative Test on Bacteria in the Digestive Tract of Vannamei Shrimp (*Litopenaeus vannamei*) at Intensive and Extensive Ponds in Ujungpangkah, Gresik  
D Ningrum, M Arief and dan K T Pursetyo  
[+](#) [Open abstract](#) [View article](#) [PDF](#)

- 
- OPEN ACCESS** 012031  
Growth Performance of Laboratory-Scale *Chaetoceros calcitrans* in Different Containers  
M Jannah, M F Ulkhaq, M H Azhar, Suciyo and dan W Soemarjati  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012032  
Study of the Dynamic Density and Diversity of Plankton at Different Brackishwater Pond Managements in Gresik, East Java  
O Tilahwatih, E D Masithah and dan B S Rahardja  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012033  
The Effect of Demineralization Stage of Agar's Solid Waste on the Characterization of Activated Carbon  
R Febrianto, Sudarno and R Kusdarwati  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012034  
The Dynamic of Density and Diversity of Cyanophyta in Different Pond Bases in Educational Pond of Faculty of Fisheries and Marine Universitas Airlangga  
S Z Cahyani, E D Masithah and Prayogo  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012035  
Effect of Different Salinity Level within Water Against Growth Rate, Survival Rate (FCR) of Catfish (*Clarias* sp.)  
D Prananingtyas, Prayogo and S Rahardja  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012036  
Molecular identification and phylogenetic reconstruction of two fiddler crabs (*Uca forcipata* and *Uca triangularis*)  
S Andriyono, H Pramono and H W Kim  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012037  
The molecular identification and phylogenetic reconstruction of Palaemonid and Penaeid shrimp from the southern part of Bangladesh  
M J Alam, S Andriyono, A T M Eunus and H W Kim  
[+](#) Open abstract [View article](#) [PDF](#)
- 
- OPEN ACCESS** 012038

Morphometric characteristics of Fur Cockles (*Anadara spp.*) in Wonokromo and Juanda Estuary, Surabaya

P B Pamungkas, K T Pursetyo, J Triastuti and N N Dewi

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012039

Stock status of ark clams (*Anadara spp.*) based on dredge fishing of the east coast of Surabaya, Indonesia

N N Dewi, K T Pursetyo, O P Darmono, F R Fachri, F S Puspitasari and A Damora

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012040

The distribution patterns and biomass of bivalves in Segoro Tambak estuary, Sedati, Sidoarjo, East Java

S H Liyana, L A Sari, N N Dewi, E D Masithah, A M Sahidu and K T Pursetyo

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012041

Inventorization of reef fish on Tabuhan Island, Banyuwangi, East Java, Indonesia

Suciyono, M A Azhar, M F Ulkhaq and H Kenconoajati

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012042

Dynamic study on the effect of calcium hydroxide and sodium bicarbonate treatment on the N/P ratio and plankton abundance

M R N Tsany, E D Masithah, B S Rahardjo and D D Nindarwi

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012043

Distribution patterns and the biomass of bivalves at Segoro Tambak estuary, Sedati, Sidoarjo, East Java

S H Liyana, L A Sari, N N Dewi, E D Masithah, A M Sahidu and K T Pursetyo

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012044

Optimization of diatom *Haslea ostrearia* cultivation in different mediums and nutrients

S Arsad, C Stavrakakis, V Turpin, P Rossa, Y Risjani, L A Sari, F S Prasetya and J-L Mouget

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012045

Coastal ecosystem model based on environmental suitability and carrying capacity of the fishpond in Banyuwangi Region, East Java, Indonesia



E W Setyaningrum, Maghdalena, A T K Dewi, M. Yuniartik and E D Masithah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012046

Development and succession of sessile macrofouling organisms on the artificial structure in the Shallow Coastal Waters of Sabah, Malaysia

M A M Affandy, J Madin, K P Jakobsen and M Auluck

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012047

Fish species difference around the light of metal halide lamps and LED lamps with mini purse seine operation

M A Sofijanto, D Arfiati, T D Lelono and A Muntaha

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012048

Status of coral diseases and compromised health syndromes on Pemuteran shallow reefs, North Bali island

W Karim

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012049

Management options for restoring artificial coral reefs in Indonesia: strengthening in institutional approach

Rudianto and Ahmad Zainul

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012050

Growth of salt-secretor and non-salt secretor mangrove seedlings with varying salinity and their relations to habitat zonation

M Basyuni, Ramayani, A Hayullah, Prayunita, M Hamka, L A Putri and S Baba

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012051

Distribution of *Ctenactis Echinata* and *Fungia Consinna* coral on Mamburit island, Sumenep regency, East Java

Sawiya, D Arfiati, Guntur and U Zakiyah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012052

Diversity species and condition of seagrass ecosystem in Teluk Awur and Prawean Jepara

I Riniatsih, A Ambariyanto, E Yudiati, R Hartati, W Widianingsih and R T Mahendrajaya

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012053

Copper (Cu) and Cadmium (Cd) toxicity on growth, chlorophyll-a and carotenoid content of phytoplankton *Nitzschia* sp

D Hindarti and A.W. Larasati

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012054

Vegetation Characteristic and Micro Environment of Mangrove Rehabilitation Forest at Coastal Areas of East Sinjai, South Sulawesi

H Setiawan

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012055

The Use of Water Lettuce (*Pistia stratiotes*) as Phytoremediator for Concentration and Deposits of Heavy Metal Lead (Pb) Tilapia (*Oreochromis niloticus*) Gills

A A D Amalia, B S Rahardja and Rr J Triastuti

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012056

The Effectiveness of Heavy Metals Pb, Cd and Zn Reduction in NPK Fertilizer Waste Combined with Biofilters of Seaweed (*Gracillaria* sp.), Blood Clam (*Anadara* sp.), and Zeolite

A R K Sari, R K Harryes, F A Anggraini, M A Alamsyah and dan A Ahadi

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012057

The Effectiveness of Combining *Gracilaria* Sp. Seaweed Biofilter and *Anadara granosa* Shell with Zeolite in the Decrease in the Level of Mercury (Hg) Heavy Metal

J A Spesatri, B S Rahardja and A A Abdillah

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012058

The Effectiveness of Combination of Seaweed (*Gracillaria* sp.), Blood Clam (*Anadara granosa*), and Zeolite as Biofilter in the Reduction of Heavy Metal Copper (Cu)

I Achmadi, B Setya and A A Ahadi

[+](#) [Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012059

Bioaccumulation of Cadmium (Cd) Heavy Metal on Seaweed (*Gracilaria* sp.) in Traditional Fishpond of Jabon Subdistrict, Sidoarjo District

O Ardiyansyah, Sudarno and Rosmanida

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012060

**Identification of Proteolytic Bacterial Isolates in Sediment Ecosystem of Gunung Anyar Mangrove Forest, Surabaya**

P B Utomo, Sudarno and B S Rahardja

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012061

**The Analysis of Cockle (*Anadara inaequalis*) Gonad Maturity Level in the Estuary of Banjar Kemuning River, Sedati, Sidoarjo**

R F Saputra, E D Masithah and P D Wulansari

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012062

**Spatial and Temporal Variation of Biomass Blood Cockle (*Anadara* sp.) in Estuaries Dadapan, Sedati Sub-District, Sidoarjo, East Java**

M R Ramadhan, K T Pursetyo, Prayogo and N N Dewi

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012063

**Distribution Patterns and Biomass of Bivalve in Juanda and Segoro Tambak Estuary in Sedati, Sidoarjo, East Java**

S H Liyana, E D Masithah and A M Sahidu

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012064

**Analysis of Cadmium (Cd) Heavy Metal on Sediment and Mangrove Leaves *Avicennia marina* at Mangrove Ecotourism Wonorejo, Surabaya**

W C Dermawan, Prayogo and B S Rahardja

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012065

**Analysis of Lead (Pb) Value Comparison on Seaweed (*Eucheuma cottonii*) in Bluto and Saronggi Sumenep Marine, Madura, East Java**

N L Komariyah, K T Pursetyo and S A Sudjarwo

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012066

**The potential addition of lemuru oil to commercial feed to increase the content of EPA and DHA in eels (*Monopterus albus*)**

A Imanisa, M B Santanumurti, M Lamid and Agustono

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012067

Effect of lysine in addition to commercial feed on crude protein and the energy digestibility of gourami (*Osphronemus gouramy*)

D Setiyawan, S H Samara, Agustono and M A A Arif

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012068

Addition of the papain enzyme to commercial feed against protein retention and feed efficiency in eels (*Anguilla bicolor*)

DA Liono, M Arief, Prayogo and W Isoni

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012069

Combination of papain enzyme and phytase enzyme in commercial feed and the protein and energy retention of tilapia *Oreochromis niloticus*

A Saifulloh, M B Santanumurti, M Lamid and W P Lokapirnasari

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012070

The effect of giving cake artificial feed on the survival rate, and growth of Common carp (*Cyprinus carpio*) larva in an Installation of Freshwater Culture (IBAT) in Punten, Batu.

I P Zainiyah, Rozi, W H Satyantini and A M Sahidu

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012071

The Utilization of Phytase Enzymes and SEM Analysis in order to increase the Quality of Rice Bran as a Layer and Fish Feed

M Lamid, Anam Al-Arif and S H Warsito

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012072

The dynamic relationship of phytoplankton abundance and diversity in relation to white shrimp (*Litopenaeus vannamei*) feed consumption in intensive ponds

D D Nindarwi, E D Masithah, D Zulian and A LA Suyoso

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012073

Effect of partial replacement of fish meal with *Spirulina platensis* meal in practical diets and culture location on growth, survival, and color enhancement of percula clownfish *Amphiprion percula*

S Hudaidah, B Putri, S H Samara and Y T Adiputra

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012074

The Effect of Different level of Probiotic Addition on Commercial Feed against Digestibility and Efficiency of Nile Tilapia Feed (*Oreochromis Niloticus*)

D Taufik, M Arief and H Kenconoajati

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012075

The Effect of Adding Synbiotics Into Commercial Feed Towards Protein Retention and Fat Retention of Dumbo Catfish (*Clarias sp.*)

H Syevidiana, M Arief and I S Hamid

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012076

The Effect of Adding Lysine in Commercial Feed on Growth Rate, Feed Efficiency, and Feed Conversion Ratio to Tambaqui (*Colossoma Macropomum*)

L V D Putra, U Agustono and S H Kenconoajati

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012077

The Effect of Coconut Shell Liquid Smoke in Commercial Feed on Total Bacteria of *Pseudomonas Aeruginosa* in the Tilapia's Kidney (*Oreochromis niloticus*)

M Rahmawati, Sudarno and S Subekti

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012078

The Effect of Coconut Shell Liquid Smoke in Commercial Feed Towards Total *Pseudomonasaeruginosa* Bacteria on Gastrointestinal Tract Tilapia (*Oreochromis Niloticus*)

S Rahmadini, Sudarno and S Subekti

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012079

Antibacterial activity of honey in preserving high-pressure cooked milkfish stored at room temperature

D A Hakim, W Tjahjaningsih and Sudarno

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012080

Bacterial composition in the gastrointestinal tract of *Uca* spp crabs fed on *Avicennia marina* leaf litter

M A B Kareho, E D Masithah and W Tjahjaningsih

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012081

The correlation between ectoparasite infestation and the total plate count of *Vibrio* sp. in pacific white shrimp (*Litopenaeus vannamei*) in ponds

G Mahasri, Rozi, A T Mukti, W H Satyantini and N M Usuman

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012082

In vitro study of an ethanolic extract of coffea leaves to inhibit freshwater pathogenic bacteria

H Kenconoajati, MF Ulkhaq, DS Budi and MH Azhar

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012083

The effect of noni fruits (*Morinda citrifolia*) with different ripeness stages against the total erythrocytes and leukocytes of comet goldfish (*Carassius auratus*) infested by *Argulus*

E Setyaningsih, Kismiyati and S Subekti

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012084

The protection capacity of the crude and whole protein spores of *Myxobolus koi* as an immunostimulant material development in goldfish (*Cyprinus carpio*) for preventing Myxobolus

G Mahasri, M Yusuf, R Woro and M B Santanumurti

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012085

Identification of white spot syndrome virus (WSSV) in pacific white shrimps (*Litopenaeus vannamei*) from ponds postexposure to immunogenic membrane proteins (*Zoothamnium penaei*)

P A Wiradana, G Mahasri, R E R Sari, U C Marwiyah and R Prihadhana

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012086

Gills and swimming leg histopathologies in pacific white shrimp (*Lithopenaeus vannamei*) from ponds exposed to the immunogenic membrane proteins of *Zoothamnium penaei*

R E R Sari, G Mahasri, P A Wiradana and U C Marwiyah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012087

Total plate count and identification of vibrio in pacific white shrimp (*Litopenaeus vannamei*) from ponds and in those exposed to immunogenic protein membrane *Zoothamnium penaei*

U C Marwiyah, G Mahasri, R E Ratnasari and P A Wiradana

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012088

Effectiveness of *Nitrobacter* on the specific growth rate, survival rate and feed conversion ratio of dumbo catfish *Clarias* sp. with density differences in the aquaponic system

A S Taragusti, M B Santanumurti, B S Rahardja and Prayogo

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012089

The erythrocyte and leucocyte profile of saline tilapia (*Oreochromis Niloticus*) in a cultivation system with nanobubbles

M Gunanti, P D Wulansari and K Kinzella

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012090

The prevalence and intensity of ectoparasites infecting vannamee shrimp (*Litopenaeus vannamei*) reared in different ponds

N Nurlatiffah, Kismiyati and MF Ulkhaq

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012091

Protozoan parasites of Vannamee Shrimp (*Litopenaeus vannamei*) in farmed fish from Pasuruan, Indonesia

U Hafidloh and P D W Sari

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012092

Growth of *Bacillus* sp. and *Flavobacterium* sp. in culture media with the addition of liquid whey tofu waste

W H Satyantini, R M Pratiwi, A M Sahidu and D D Nindarwi

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012093

The effect of noni *Morinda citrifolia* L. fruit extracts on the gill histopathological changes of Nile tilapia *Oreochromis niloticus*

A T Mukti, E Dewi, W H Satyantini, L Sulmartiwi, Sudarno and M Hassan

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012094

Prevalence and intensity of ectoparasites in Pacific white shrimp (*Litopenaeus vannamei*) seeds from a pond and hatchery

G Mahasri, T Hidayat and Sudarno

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012095

Prevalence and intensity of ectoparasites in gabus fish (*Channa striata*) at Cangkringan Fishery Cultivation Technology Development Center, Sleman, Yogyakarta

E N Fitriani, Rozi, M Arief and H Suprpto

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012096

Antibacterial activity of bitter melon (*Momordica charantia L.*) leaf extract against *Aeromonas hydrophila*

D A Masithoh, R Kusdarwati and D Handijatno

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012097

Determination of the *aerolysin* gene in *Aeromonas hydrophila* using the polymerase chain reaction (pcr) technique

G Christy, R Kusdawarti and D Handijatno

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012098

Bioaccumulation and histopathological effect on the gills and liver of silver barb (*Barbonymus gonionotus*) exposed to the heavy metal nickel

I Purwanti, W Arroisi, B S Rahardja and L Sulmartiwi

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012099

Identification and prevalence of the ectoparasite *Octolasmis* in sand lobster (*Panulirus homarus*) and bamboo lobster (*Panulirus versicolor*) in Floating Net Cages in Sape, Bima Regency, West Nusa Tenggara Province, Indonesia

L. Yusgita, Kismiyati, S. Subekti, P D Wulansari and M K Amiin

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012101

Superoxide dismutase (SOD) and metallothionein (MT) *Tubifex tubifex* at the acute mercury exposure

I M Widiastuti, A M S Hertika, M Musa and D Arfiati

[+](#) Open abstract [View article](#) [PDF](#)

---

**OPEN ACCESS**

012102

Antifungal activity of marine sponges (Class Demospongiae) collected from Biak, Indonesia



R D Kasitowati, K Witriansyah, A Trianto, D C Pratiwi and M A P Panjaitan

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012103

Antibacterial activities of *Physalis angulata* herb extract on white feces diseases (WFD) in *Litopenaeus shrimp vannamei*

E Saraswati and AS Wijaya

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012104

The Effects of Mercury Chloride (Hgcl<sub>2</sub>) on the Changes in Hematology and Blood Sugar Level in Carps (*Cyprinus carpio*)

I Setiyowati, H Suprpto and G Mahasri

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012105

Change in Two-Spot Catfish Histopathological Liver (*Mystus nigriceps*) Accumulated with Heavy Metal Cadmium (Cd) in Ketingan Estuary, Sidoarjo - East Java, Indonesia

L Anggitasari, H Suprpto and dan D D Nindarwi

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012106

Effectiveness of Pepaya Leaf Extract (*Carica Papaya* L.) to Control Ectoparasite *Argulus* on Common Carp (*Cyprinus Carpio*)

L S Azizah, Kismiyati and A H Fasya

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012107

Bacterial Identification from Marine Ornamental Fish in Fish Quarantine, Quality Control and Fishery Products Safety Class I Denpasar, Bali

N R Rukmana, G Mahasri, S N Hidayah, M F Ulkhaq and H Kenconoajati

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012108

Prevalence and Intensity of Ectoparasites of Tilapia (*Oreochromis niloticus*) in Ponds with Low, Medium and High Stocking Density

M Indahsari, Kismiyati and M F Ulkhaq

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012109

Texture profile of the bread produced from composite flour *Bruguiera gymnorrhiza* flour (BGF) and wheat flour

M N G Amin, M N Hasan, Zakariya, S A Pralebda, H Pramono, E Saputra, S Subekti and M A Alamsjah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012110

The potential of seaweed waste (*gracilaria* sp. and *eucheuma cottonii*) as a medium density fiberboard (mdf)-based pot material for better water use efficiency in tomato plants

H Kurnia, R R Rifadi, Agustono, M N G Amin, S A Sudjarwo and M A Alamsjah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012111

Characterization of edible coating based on surimi fillet catfish as biodegradable packaging

E Saputra

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012112

Characteristics of the fish protein isolate recovered from Sardine by-products using the Isoelectric Solubilization- Precipitation method

H. Pramono, N T Irawan and M R A Firdaus

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012113

The potential of peptides derived from the chymotrypsin hydrolysate of soft shelled turtle yolk against the Angiotensin I Converting Enzyme

D Y Pujiastuti and J L Hsu

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012114

Kappa and iota carrageenan combination of *Kappaphycus alvarezii* and *Eucheuma spinosum* as a gelatin substitute in ice cream raw material product

I Suryani, D I Permata Sari, D M Astutik and A Abdillah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012115

Detection of antibiotic-resistant *Salmonella* sp. in the seafood products of Surabaya local market

H Pramono, A Kurniawan, N Andika, T F Putra, M A R Hazwin, S Utari, A P Kurniawan, E D Masithah and A M Sahidu

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012116

The effect of kappa-carrageenan fortification on the physicochemical and organoleptic properties of milkfish galantin

D Darmawan, L Sulmartiwi and A A Abdillah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012117

The application of a high voltage electric field (HVEF) to reduce *Escherichia coli* and *Salmonella thyphimurium* bacteria in red snapper (*Lutjanus* sp.) fillets

D J Subakti, H Pramono and J Triastuti

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012118

Isolation and identification of fish import consumption bacteria in a fish quarantine center, focusing on the quality control and safety of fishery products at Tanjung Priok, Jakarta

H S Farizky and W H Satyantini

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012119

Replacement of gum arabic by dry *Spirullina* sp. biomass as a food emulsifier in bread making

D Wulandari, M N G Amin, E D Masithah, M Lamid and M A Alamsjah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012120

Nutrient improvement of *Bruguiera gymnorrhiza* peel fruit through fermentation using commercial tempeh (Indonesian fermented soybean) mold

M N G Amin, R A Prastiya, M N Hasan, Zakariya and M A Alamsjah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012121

DPPH scavenging property of bioactives from soft corals origin palu bay, Central Sulawesi, Indonesia

W A Tanod, U Yanuhar, Maftuch, D Wahyudi and Y Risjani

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012123

Harvesting *Chaetoceros gracilis* by flocculation using Chitosan

W AA Yamin, S R M Shaleh, F F Ching, R Othman, M Manjaji-Matsumoto, S Mustafa, S Shigeharu and G Kandasamy

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012124

The Use of Rajungan (*Portunus Pelagicus*) Shells as Flour in Wet Noodles Ingredient

A Rahma, A A Abdillah and E Saputra

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012125

### The Potential of Lindur Fruit Flour (*Bruguiera Gymnorhiza*) in Reducing Oil Absorption of Milkfish Nugget during the Deep Frying Process

A Widyastuti, AA Abdillah and Laksmi Sulmartiwi

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012126

### Chemical and Sensory Characteristics of Flakes Made from Seaweed (*Eucheuma cottonii*) and Soybean (*Glycine max* (L.) Merrill)

I R Firdarini, Kismiyati and A Manan

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012127

### The Effect of Maltodextrin Concentration on the Characteristics of Snappers' (*Lutjanus* sp.) Peptone

R Ningsih, Sudarno and Agustono

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012128

### Physics and Chemical Characteristics of Sargassum Sp. Seaweed with Addition of Sodium Alginate Stabilizer to Different Concentrations

M Via, A A Abdillah and M A Alamsjah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012129

### The Effect of Sorbitol Addition on the Characteristic of Carrageenan Edible Film

M Rahmawati, M Arief and W H Satyantini

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012130

### The Utilization of Flower Crab (*Portunus Pelagicus*) Shell as Pasta Flavor

R Rahmawati, E Saputra and A A Abdillah

[+ Open abstract](#) [View article](#) [PDF](#)

---

**OPEN ACCESS**

012131

### Income analysis of catching fish using dogol (demersal danish seine) in the sub-district of Brondong, Lamongan

A Aulia, A M Sahidu and Agustono

[+ Open abstract](#) [View article](#) [PDF](#)

**OPEN ACCESS**

012132

Area development based on conservation and ecotourism on the Cemara Beach (Pine Trees Beach), Pakis, Banyuwangi, East Java Province, Indonesia

E W Setyaningrum, A T K Dewi, K P Prapti, Z Erwanto and H D Susanti

[+ Open abstract](#) [View article](#) [PDF](#)

**OPEN ACCESS**

012133

Socioeconomic and institutional factors affecting the sustainable development for fisheries in Bontang City, Indonesia

B I Gunawan

[+ Open abstract](#) [View article](#) [PDF](#)

**OPEN ACCESS**

012134

Factors influencing the market requirements fulfillment in small medium enterprise fish processors in East Java

W Sulistyowati, Soemarno, A Efani and M Primyastanto

[+ Open abstract](#) [View article](#) [PDF](#)

**JOURNAL LINKS**

---

[Journal home](#)

---

[Information for organizers](#)

---

[Information for authors](#)

---

[Search for published proceedings](#)

---

[Contact us](#)

---

[Reprint services from Curran Associates](#)

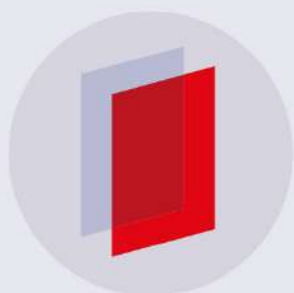


PAPER • OPEN ACCESS

## The correlation between ectoparasite infestation and the total plate count of *Vibrio* sp. in pacific white shrimp (*Litopenaeus vannamei*) in ponds

To cite this article: G Mahasri *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **236** 012081

View the [article online](#) for updates and enhancements.



**IOP | ebooks™**

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the collection - download the first chapter of every title for free.

# The correlation between ectoparasite infestation and the total plate count of *Vibrio* sp. in pacific white shrimp (*Litopenaeus vannamei*) in ponds

G Mahasri<sup>1\*</sup>, Rozi<sup>1</sup>, A T Mukti<sup>1</sup>, W H Satyantini<sup>1</sup> and N M Usuman<sup>2</sup>

<sup>1</sup>Department of Fish Health Management and Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya, Indonesia 60115

<sup>2</sup>Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya, Indonesia 60115

\*Corresponding author: [mahasritot@gmail.com](mailto:mahasritot@gmail.com)

**Abstract.** Ectoparasite infestation and *Vibrio* sp. bacterial infection are a major factor causing the death of pacific white shrimp (*Litopenaeus vannamei*), which can cause an increased mortality rate up to 100% only three days after infection, especially in hatcheries. Ectoparasites that are often found in shrimp culture include *Zoothamnium* sp., *Epistylis* sp. and *Vorticella* sp. Meanwhile, the *vibrio* bacteria that are often found in the same setting are *Vibrio alginolyticus*, *Vibrio harveyii*, *Vibrio parahaemolyticus* and *Vibrio fulvificus*. The aim of this research was to analyze the correlation between ectoparasite infestation and the total plate count of *Vibrio* sp. in white shrimp (*Litopenaeus vannamei*) during a culture of up to 90 days in ponds. The method used in the research study was an experimental design with a sampling time spaced out over 0, 30, 60 and 90 days. The results showed that the ectoparasites found to be infecting the white shrimp were *Zoothamnium* sp. and *Vorticella* sp. with the lowest number of ectoparasites being 4 individuals found on the 90<sup>th</sup> day. The highest number was 63 parasites on the 60<sup>th</sup> day. The lowest *Vibrio* sp. total plate count was  $2.9 \times 10^4$  CFU/g and the highest was  $5.55 \times 10^4$  CFU/g.

## 1. Introduction

Tiger shrimp (*Penaeus monodon* Fab.) are a type of marine shrimp that can develop within pond culture; the survival rate can reach up to 90%. In Indonesia, shrimp were once the best non-oil and gas export commodity from the fisheries sector and once made Indonesia the world's fourth major shrimp exporting country with an export value of \$1.9 US dollars. However, since the beginning of 1994, shrimp production from the pond culture sector has tended to continue to decline until it has reached a stationary point. The production decline is due to the cases of shrimp death in ponds that are mainly caused by disease and the decreasing water quality [1]. In order to increase shrimp production, in 2002, the Indonesian Government legalized white shrimp (*Litopenaeus vannamei*) to be developed in Indonesia through aquaculture in ponds.

Many problems have emerged in the development of white shrimp culture, where the outbreak of disease is a factor that causes a harvest failure and therefore needs serious attention. One of the diseases that can cause the death of shrimp in both ponds and hatcheries is Zoothamniosis. This disease is one of the parasitic diseases of white shrimp caused by *Zoothamnium penaeid*. Zoothamniosis causes the shrimp to find it hard to breathe and difficult to move, and thus they are unable to find food [2]. The shrimp also find it difficult to change their skin (molting), which inhibits growth, reduces their economic value and causes death by up to 91% [3]. The prevention of





Zoothamniosis using immunostimulants made from protein membranes has never been done before, even though the isolation and identification of suitable proteins from several *Zoothamnium* species has been carried out. Meanwhile, the treatment that has been done includes the use of chemicals and antibiotics, which can cause residue in the shrimp meat.

Improving the shrimp's immune response both in hatcheries and in ponds can be done using immunostimulants. Furthermore, immunization with *Zoothamnium penaei* immunogenic membrane protein can increase shrimp survival rates by 93% [4]. Furthermore, the isolation of the immunogenic membrane protein was carried out using SDS-PAGE, ELISA and Western Blotting. The results of the analysis showed that 7 proteins were found and that 3 proteins were immunogenic, namely protein membranes MP38, MP48, and MP67.

The invertebrates' (including shrimp) immune system, which has a role in the body's defense mechanisms due to haemocytes, is where the spread and increase in the number of haemocytes is assumed to be a form of cellular immune response in the shrimp's body [5,6]. In order to carry out phagocytic activity including the encapsulation, nodulation and activation of the prophenoloxidase system, including anti-microbial and toxic compounds, the release of several proteins is needed to overcome the incoming agent [7].

The presence of an immune response in shrimp can be seen by an increase and change in the haemocytes, namely the Total Haemocyte Count (THC) and Differential Haemocyte Count (DHC) [6]. Starting from the description above, it is very important to find an alternative effort to prevent the high mortality of white shrimp by using immunostimulants from *Zoothamnium penaei*'s membrane protein, which has been tested and is ready to use in ponds and can be applied easily and widely.

Based on the research background, the objectives of this study are: 1) to conduct a protein membrane field test of *Zoothamnium penaei* immunogenic to see if it can reduce the parasitic infestation (*Zoothamnium penaei*) in white shrimp (*Litopenaeus vannamei*) in ponds and 2) to conduct a protein membrane field test of *Zoothamnium penaei* immunogenic as an immunostimulant material to decrease the mortality of white shrimp (*Litopenaeus vannamei*) in ponds.

## 2. Materials and methods

### 2.1 Materials and tools

The main materials used in this research were 10,000 healthy white shrimp post-larval at 40 days old (juvenile). *Zoothamnium penaei* whole protein was the material used for developing the immunostimulants, which had been tested previously in a laboratory setting by as much as 5 ppm [4]. The examination of the bacterial infection was done through PCR. The water quality checks were conducted using a DO meter, pH meter, thermometer, soil pH meter, secchi disk and a water sampling tool. For the immunization, a plastic tub with a 10 liters capacity filled with water was used.

### 2.2 Pond preparation

The pond used in this research consisted of three plots, namely a reservoir plot, recirculation plot with a biology filter against milkfish and a shrimp maintenance plot. Each plot was connected with two paralonals (8 dim) to promote recirculation flow. The recirculation will be operated by a water pump sized 20 x 8 inches.

### 2.3 White shrimp seed preparation

The healthy white shrimp seeds used in this study came from shrimp seedlings in Tanggul Rejo Village, Ujung Pangkah District, Gresik Regency. The shrimps were in the juvenile stage; this means that they were 30 days old with a length of about 3 - 4 cm. The shrimp seeds used for the trial totaled 100,000. The shrimp were brought to the pond using plastic bags filled with oxygen. The shrimps were acclimatized by opening the plastic bag after arrival at the pond and then placing it on the surface of the pond.

#### 2.4 Research design

This research design was an experimental study with the aim of analyzing the pathogenic infections from parasites, bacteria and viruses that often attack white shrimp in ponds with immunoprobio-circulation (SI-PBR) systems. The following treatments were implemented:

K1 → control; the group of shrimp that were kept in ponds in a semi-intensive manner without using immunostimulants from Whole Protein *Zoothamnium penaei*.

K2 → a group of shrimp kept in ponds in a Semi-Intensive system using immunostimulants from Whole Protein *Zoothamnium penaei*.

#### 2.5 Maintenance of shrimp with immunostimulants in ponds

The shrimp were maintained for 3 months in one harvest period. The seed used was made up of white shrimp in the juvenile stage (40 days old). We used 4 pieces of plot with an area of 500 square meters each; reservoirs, biological filter plots and 2 shrimp maintenance plots. The stocking density of milkfish in the biological filter plots totaled as many as 2000 tails, while the stocking density of the white shrimp was 5,000 shrimp in one plot of maintenance. Circulation was carried out at 06.00 - 08.00 (for two hours) and 24.00 - 02.00 (for 2 hours).

#### 2.6 Ectoparasite infestation examination of white shrimp

The observation of the ectoparasite infestation was done through the native method namely by scrapping the entire surface of the shrimp's body [8]. The results of the scraping were placed on a glass object, given one drop of water and observed with a binocular microscope on 100x magnification. The parasitic infestation was calculated through the positive infested shrimp percentage that was being examined. For the examination and characterization of the *Vibrio* sp bacteria, we performed PCR according to the modification of the Anderson method [9]. The stages of this method included the extraction of bacterial DNA, electrophoresis, documentation and reading the results with a digital camera.

#### 2.7 Survival rate calculation

The survival rate calculation of the white shrimp was carried out at the harvest, which was after one month of maintenance in the pond. This was expressed by the percentage of the total number of shrimp that lived in the overall pond population.

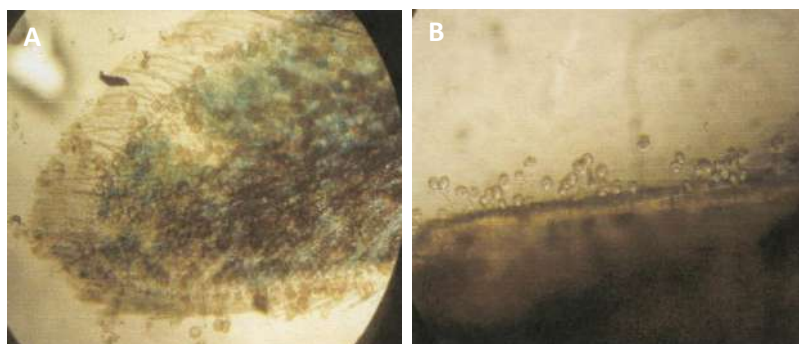
#### 2.8 Data analysis

The data was analyzed descriptively and presented in the form of a table and images. In order to find out the correlation between the ectoparasite infestation and *Vibrio* sp. bacterial infection, we used a t-test [10].

### 3. Results and Discussion

#### 3.1. *Zoothamnium penaei* Infestation Examination in White Shrimp

The results showed that all of the shrimp samples were positive for infection by zoothamniosis caused by *Zoothamnium penaei*. Based on the identification of the parasite, the white shrimp were found to be positively infested with *Zoothamnium penaei*. All of the shrimp infected with zoothamniosis showed clinical symptoms over their entire bodily surface, and they also had attached parasites on the gills and were a brown-white color. In addition, it also appeared that they had an empty digestive tract, lackluster body surface and their gills were cloudy and dirty. Some of the shrimps showed damage to organs such as the antenna, rostrum, tail, pleopod and periopod. An illustration of a shrimp infested with *Zoothamnium penaei* has been presented in Figure 1.



**Figure 1.** Illustration of *Zoothamnium penaei* infestation on a few organs, A: Tail and B: Dorsal (100x magnification)

The results of the *Zoothamnium penaei* infestation examination conducted on the white shrimp at the end of the test have been presented in Table 1, which shows that the highest level of parasitic infestation in white shrimp occurred in those that were not immunized with whole protein (K1); these showed as being 68% positive for parasitic infestation. The lowest parasitic infestation was in a group of shrimps that were given protein of 2.8% (K2) after maintenance for 90 days.

**Table 1.** Results of the Parasite Infestation Examination on White Shrimp

| Maintenance Days<br>(Days) | Shrimp Ectoparasites Examination Result (%) |                                      |
|----------------------------|---|--------------------------------------|
|                            | Maintenance without Whole Protein (K1)      | Maintenance using Whole Protein (K2) |
| 1                          | 2,3   | 2,2                                  |
| 30                         | 16,5  | 11,3                                 |
| 60                         | 38,3  | 7,3                                  |
| 90                         | 68,2  | 2,8                                  |

### 3.2. Bacterial infection examination in white shrimp

Bacterial disease in shrimp is often caused by the *Vibrio* bacteria, especially *Vibrio harveyii*, *Vibrio parahaemolyticus* and *Vibrio alginoliticus*. The results can be seen in Table 2.

**Table 2.** Bacterial Infection Examination in White Shrimp

| Maintenance Days<br>(Days) | Total Plate <i>Vibrio</i> sp<br>(CFU/ml) |                                      |
|----------------------------|--|--------------------------------------|
|                            | Maintenance without Whole Protein (K1)   | Maintenance using Whole Protein (K2) |
| 1                          | $1,2 \times 10^5$                        | $1,2 \times 10^4$                    |
| 30                         | $9,6 \times 10^5$                        | $7,4 \times 10^3$                    |
| 60                         | $14,7 \times 10^5$                       | $5,6 \times 10^3$                    |
| 90                         | $19,2 \times 10^5$                       | $4,8 \times 10^3$                    |

Table 2 shows the white shrimp seeds that were stocked in ponds with SI-PBR or that were not using SI-PBR that showed as positive for *Vibrio alginoliticus* bacteria. There was an increase after this setting was maintained for the 30<sup>th</sup> day without SI-PBR as it reached  $18,2 \times 10^4$  CFU/ml, while in the shrimp that were kept in ponds with SI-PBR, the number of colonies also increased.

### 3.3. White shrimp survival rate calculation result from the challenge test

The white shrimp survival rate calculation results after 30 days of maintenance showed that there were significant ( $p < 0.05$ ) differences between the white shrimp that had been given a membrane protein and those that had not given a membrane protein. The highest survival rate occurred in the white shrimp that were given the MP38 immunogenic membrane protein by 94% and this was followed by MP48 and MP67, which were 84% and 72% (Table 3).

**Table 3.** White Shrimp Survival Rate when Immunized by MP38, MP48 and MP67 membrane proteins

| Treatment Category                     | White Shrimp Survival Rate ( % ) |
|--|----------------------------------|
| Maintenance without Whole Protein (K1) | 38,00 <sup>bc</sup> ± 8,37       |
| Maintenance using Whole Protein (K2)   | 86,00 <sup>d</sup> ± 4,47        |

Information: The different superscripts in each column and row showed that there was a significant different ( $p < 0,05$ )

### 3.4. Discussion

The results showed that there was a decrease in the infestation of the *Zoothamnium penaei* parasite and the *Vibrio parahaemolyticus* bacterial infection along with an increase in the age of the shrimp in the pond (Table 1 and 2). *Zoothamnium penaei* infestation and *Vibrio parahaemolyticus* bacterial infection had begun to be found in 30 day old shrimp that were maintained using immunostimulants. However, the highest infestation rate occurred in white shrimp that were not exposed to whole protein, which amounted to 68,2%. The infestations in shrimp exposed to whole protein, at 30, 60 and 90 days, all showed lower numbers when compared with those who had not been exposed to protein.

The use of immunostimulants in white shrimp culture can increase the immune response characterized by the decrease in parasite infestation and in the infection rate of *Vibrio* sp bacteria. The immunostimulant's ability in the culture system can also be seen in the survival rate of white shrimp that increased from 38% to 86%. This means that immunostimulants from the *Zoothamnium penaei* protein were able to provide protection to the white shrimp maintained in the ponds. Whole protein that enters the body of the shrimp will stimulate the activity of the haemocyte cells in an effort to fight the pathogens that entered the body of the shrimp during maintenance. Haemocytes that are activated by crude protein will carry out phagocytic activity in the shrimp through their hyalin (granular) and semi-granular cells [4,11].

The immune system in shrimp is still primitive and unlike that of fish and mammals that contain immunoglobulins. The immunoglobulins in shrimp are replaced by a Prophenoloxidase Activating Enzyme (PPA) [5]. PPA is a protein located in the granular hemocytes. PPA can be activated by lipopolysaccharide and  $\beta$  1,3-Glucan, which will stimulate prophenoloxidase to become phenoloxidase. As a result of these changes, a kind of Opsonin Factor protein can be produced which can induce the hyalin cells to phagocytosis. The haemocyte cells will degranulate and some of the proteins will be released for the benefit of the immune response, such as increased haemocyte cells, and entrapment and phagocytosis activities [8]. In addition, immunogenic membrane proteins will stimulate haemocytes to release proPO and protein-binding PPA, resulting in haemocytes increasing their activity to trap and go into phagocytosis against any disease agents, which in this case, is *Zoothamnium penaei*. This is evidence that the prevalence of Zoothamniosis in immunized shrimp is lower and very significantly different from the prevalence in the unimmunized shrimp. There were still shrimp infested with *Zoothamnium penaei* because this parasite is opportunistic, so in normal water conditions, it still grows but develops over a long time and does not cause pain in the shrimp.

However, the condition of these waters has not been able to cause increased activity in the *Vibrio parahaemolyticus* bacteria, therefore it has not caused pain in the shrimp.

If whole protein, as an immunostimulant ingredient, enters the body of the shrimp, then it will cause an increase in the total number of haemocytes (THC) and differential haemocyte cells (DHC). This indicates the increase in the body's shrimp defenses against pathogenic infections [4]. Furthermore, the administration of vaccines can prevent infection and lead to the increased activity of the phagocytes related to the haemocytes and proPO enzymes [12]. Vaccine ingredients that enter the body of the shrimp will cause antibodies that can neutralize the *Zoothamnium penaei* infestation [6].

Immunogenic membrane proteins that enter the body can increase the survival rate of white shrimp from 38% to 86% in 90 day old shrimp (end of maintenance) [4]. Furthermore, it was also said that the immune response of the tiger shrimp also increased.

An increased immune response can be used as an indicator or sign of pathogenic infection in the host's body. This infection will cause inflammation, which is a non-specific bodily defense characteristic due to influencing factors such as parasites, bacteria, fungi, viruses and non-living agents [13,14].

The increase in the immune response is because the shrimp do not have memory cells in their immune system, so they are unable to detect pathogenic substances that they have been exposed to. Thus it can be argued that immunostimulant material from crude protein can induce the body's shrimp defense mechanism. However, it takes time to stimulate the hematopoietic organs to produce granulocytes to fight zoothamniosis attacks [4]. These granulocytes will destroy pathogens by ingesting them, so the granulocytes will migrate to organs that have parasitic and bacterial infection.

## 5. Conclusion

The conclusion that can be drawn from in this study is that in white shrimp, there is a correlation between ectoparasite infestation and *Vibrio* sp bacterial infection. The higher presence of *Vibrio* sp bacterial infection was indicated by the increase in the *Vibrio* bacteria Total Plate Count (TPC). The shrimp were maintained in semi-intensive ponds infested with ectoparasites and infected with *Vibrio* bacteria. There were populations that were both exposed and not exposed to *Zoothamnium* whole protein.

## 6. References

- [1] Chamratchakool P, Turnbull J F, Limsuwan C 2001 *Health Management in Shrimp Ponds*. (Bangkok: Health Research Institute) p 50 – 53
- [2] Itabashi T, Mikami K, Asahi H 2003 *Res Microbiol* **154** 361-7
- [3] Tonguthai K 2001 *Diseases of the Freshwater Prawn *Macrobrachium rosenbergii** AAHRI Newsletter Article Bangkok
- [4] Mahasri G 2007 *Zoothamnium penaei immunogenic membrane as Immunostimulants Development Matter on Tiger Shrimp (*Penaeus monodon* Fab.) to Prevent Zoothamniosis*. *Disertation* (Surabaya: Post-Doctoral Universitas Airlangga)
- [5] Raa J 2000 *The use of immunostimulant in fish and shellfish feeds*. In: LE. Cruz Suarez, D. Richie-Marie, M. Tapia-Salazar, MA. Olver-Novoa, R. Civera-Cerecedo (Eds), *Avances en Nutricion Acuicola Yucatan* p 47-54
- [6] Raa J, Roerstad G, Engstad R, Robertson B 2002 *The Use of Immunostimulants to Increase Resistance of Aquatic Organisms to Microbial Infection*. In: Diseases in Asian Aquaculture. I. Shariff, M. R. P. Subasinghe and J.R. Arthur (Eds). *Fish Health Section Asian Fish Social*. Manila: 39-50
- [7] Person M, Cerenius L, Söderhall K 2007 *J. Fish. Disease* **10** 471-477
- [8] Johnson M W, Söderhall K 2009 *Parasitology Today*, **5** 171-176
- [9] Anderson D P, Siwicki 2005 Basic Haematology and Serology for Fish health programs. In: Disease in Asian Aquaculture II. M. Shariff, J.R. Arthur, R.P. Subangsinghe (Eds) *Fish Health Section Asian Fisheries Society* p 185-202

- [10] Steel R G, Torrie J H 1989 *Prinsip Prosedur Statistika* (Jakarta: Gramedia) p 425-478
- [11] Van de Braak C B R, Botterblom M H A, Liu W, Teverne N, Van der Knaap W P W, Rombout J H W M 2000 *Fish & Shellfish Immunology* 12
- [12] Itami T, Kondo M, Takahasi Y 2006 *Enhancement of Disease Resistance of Kuruma Prawn, *Penaeus japonicus* After Oral Administration of Peptidoglycan*. (Japan: National Fisheries University) p 7: 59-65
- [13] Söderhall K, Cerenicus L, Johanson M W 2006 *The prophenoloxidase activating system in invertebrates*. In: Söderhall, S. Iwanaga and GR. Vasta (Eds). *New directions in Invertebrate Immunology. SOS Publ Fair Haven: 229 -253*
- [14] Zaleski M, Claps M C 2000 *First Record of Some Peritrichs Ciliates for San Miguel Del Monte Pond (Buenos Aires, Argentina)*. Institute of Limnology: Dr. R. Ringuelet, Florencio Farela. Argentina