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Kelee Ira B. Nodque, Cleresa S. Dionela, Fredson H. Huervana, Rex Ferdinand M. Traifalga (Institute of Aquaculture, College of Fisheries and Ocean Sciences, University of the Philippines Visayas, Miagao, Iloilo, Philippines)
The Growth Kinetics and Total Lipid Content Of *Thalassiosira* sp. Under Mixotrophic Conditions

Indonesian Aquaculture Journal, 19(1), 2024, 1-9

Conventional microalgae culture is challenged by issues of light limitation and cell self-shading. This study aims to evaluate the impact of different cultivation modes on the growth and lipid content of *Thalassiosira* sp. The diatom, *Thalassiosira* sp., was grown in autotrophic, mixotrophic-suspended, and mixotrophic-biofilm conditions until the stationary phase was reached. After four (4) days of culture, analysis of the cell densities revealed a significant difference between groups, with cell densities of 7.3×10^5 cells mL⁻¹ for control, 1.1×10^6 cells mL⁻¹ for mixotrophic-suspended, and 1.9×10^6 cells mL⁻¹ for mixotrophic-biofilm cultures. Both treatments are significantly higher than the control. However, mixotrophic-biofilm culture achieved the highest cell density among all cultivation modes, 161.81% higher than the control. The specific growth rate of *Thalassiosira* sp. in mixotrophic-biofilm culture was highest among treatments, while the doubling time was significantly highest in the control. Moreover, mixotrophic-biofilm culture attained the highest biomass at 56 mg 100 mL⁻¹. *Thalassiosira* sp. cultured under mixotrophic-biofilm also recorded the highest lipid content at 9.89%. It is both significantly higher than the control (3.06%) and the mixotrophic-suspended culture (6.15%). The cell density, algal biomass, and lipid content of *Thalassiosira* sp. under mixotrophic-biofilm culture highlight this culture strategy's promising potential in improving microalgae growth and lipid content, ridding of light as an indispensable growth factor.

KEYWORDS: biofilm; lipid content; mixotrophic growth; suspended culture; *Thalassiosira*

The Best Akbar Esa Putra, Widanarni, Dinamella Wahjuningrum, and Munti Yuhana (Department of Aquaculture, Faculty of Fisheries and Marine Science, IPB University)
Commercial Herbs Administration For Preventing *Vibrio parahaemolyticus* Infection In *Litopenaeus vannamei* Shrimp

Indonesian Aquaculture Journal, 19(1), 2024, 11-23

Vibrio parahaemolyticus is one of the pathogens in crustaceans that can cause mass mortality in *Litopenaeus vannamei* shrimp farming. This study aimed to evaluate the effect of administering the commercial herbs supplement Phycurma Aquatic (PA) through feeding at different doses to prevent *Vibrio parahaemolyticus* infection in *L. vannamei* shrimp. This study used a completely randomized design (CRD) consisting of five treatments and three replications, which are negative control group, positive control group, and PA at doses of 2.5, 5.0, and 7.5 mL kg⁻¹ feed. Shrimps were reared for 30 days and fed five times a day. On the 31th day, shrimps were challenged with *V. parahaemolyticus* at a dose of 10⁵ CFU mL⁻¹, except for the negative control group. The results showed that the administration of 5.0 mL kg⁻¹ of PA in the feed gave the best growth performance ($P < 0.05$) compared to other treatments. The administration of 5.0 mL kg⁻¹ PA in feed also enhanced shrimp health status and significantly increased the total hemocyte count, phagocytic activity, respiratory burst, and phenoloxidase. Furthermore, the administration of PA also increased antioxidant activity, reduced malondialdehyde levels, decreased *V. parahaemolyticus* population in the intestine, and reduced hepatopancreas tissue damage. Moreover, the survival rate of *vannamei* shrimp before and after the challenge test in the treatment group with a dose of 5.0 mL kg⁻¹ of PA was significantly higher ($P < 0.05$) compared to other treatments.

KEYWORDS: Commercial herbs; health status; phycurma aquatic; *V. parahaemolyticus*; *L. vannamei*

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Ademola Zaid Aderolu, Ismail O. Ishola, Uzeme Precious Aluta, and Boluwatife O. Williams (Department of Marine Sciences, Faculty of Science, University of Lagos, Akoka, Lagos, Nigeria)
The Effect Of Dietary Supplementation Of *Sargassum Wightii* Extract On *Clarias Gariepinus* Physiological Responses

Indonesian Aquaculture Journal, 19(1), 2024, 25-34

Seaweeds are becoming vital feed materials due to their high concentration of nutrients and active secondary metabolites. In this context, the brown seaweed *Sargassum wightii* extract (SWE) was included in *Clarias gariepinus* diets to investigate its effects on growth rate, nutrient utilization, haemato-biochemical indices, antioxidant activities and immune responses. Four experimental diets with different levels (control- 0 %, 0.25 %, 0.5 %, and 1.0 %) of SWE were fed to four experimental groups of *C. gariepinus* juvenile (mean initial weight 14.50 ± 0.00 g) for 28 days. At the end of the feeding trial, there was no significant difference ($p > 0.05$) in the growth performance of fish groups fed SWE and the control group. However, there were significant differences ($p < 0.05$) in feed conversion ratio and protein efficiency ratio between the control and SWE groups. Erythrocytes, leukocytes, haemoglobin, lymphocytes, and high-density lipoprotein cholesterol in fish fed SWE supplemented diets were significantly higher ($p < 0.05$) than control. Notably, the liver function enzyme such as alkaline phosphatase was significantly higher ($p < 0.05$) in fish fed SWE diets when compared to the control group. There was higher significant variation ($p < 0.05$) in hepatic antioxidant enzymes activities across all diets. It was also observed that TNF- α , IL-6 and IL- β increased significantly in the liver of *C. gariepinus* fed SWE supplemented diets compared to control. Therefore, these results suggest that inclusion of *S. wightii* extract in the fish diet could improve the immune status and reduced oxidative stress of *C. gariepinus*.

KEYWORDS: *C. gariepinus*; *S. wightii*; Phytochemicals; Antioxidative properties; Blood profile; Immunostimulatory effects

Nia Oktavia, Vitas Atmadi Prakoso, Mohammad Mukhlis Kamal, Otong Zenal Arifin, Jojo Subagja, Kurniawan Kurniawan, Aliati Iswantari, Irin Iriana Kusmini, Deni Irawan, Wahyulia Cahyanti, Deni Radona, Fera Permata Putri, Ofan Bosman, Arif Wibowo, Anang Hari Kristanto, and Rudhy Gustiano (Department of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, IPB University, Bogor, Indonesia)
A Study On The Growth And Physiological Response Of Juvenile Tinfoil Barb *Barbonymus schwanenfeldii* (Bleeker, 1854) Under The Influence Of pH Changes

Indonesian Aquaculture Journal, 19(1), 2024, 35-34

Tinfoil barb *Barbonymus schwanenfeldii* is recognized as one of the potential aquaculture commodities in Indonesia. Nonetheless, lack of data on their environmental tolerance causing this issue to become essential to be investigated. The present study was carried out to assess the pH influence on growth and physiological response of juvenile tinfoil barb. Juvenile tinfoil barbs (TL: 5.5 ± 0.8 cm; BW: 2.4 ± 1.0 g) were treated with four pH level treatments (5, 6, 7, and 8) and three replications with the stocking density of 10 fish each aquarium. Fish were kept for 21 days and fed with commercial fish feed. In this study, pH 8 exposure resulted to lower growth of juvenile tinfoil barb compared to pH treatment 5 to 7 ($p < 0.05$). In terms of survival rate, the results showed significantly lower value at pH 8 treatment compared to those of pH 6 and 7 treatment ($p < 0.05$), while it is not significantly different with pH 5 treatment ($p > 0.05$). Additionally, this study found the highest value of glucose, cortisol, and aspartate aminotransferase (AST) on pH 8 treatment ($p < 0.05$). On the other hand, pH 8 exposure led to the lowest creatinine, blood urea nitrogen (BUN), and alkaline phosphatase (ALP) level ($p < 0.05$). In conclusion, the optimal pH for juvenile tinfoil barb rearing ranged around 6-7.

KEYWORDS: *Barbonymus schwanenfeldii*; pH; physiological response; specific growth rate; fish stress

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Gabriella Augustine Suleman, Widanarni, Munti Yuhana, and Usamah Afiff (¹Department of Aquaculture, Faculty of Fisheries and Marine Science, IPB University)
Growth, Immunity, And Resistance Of Catfish (*Clarias* sp.) Reared In Biofloc System Supplemented With *Bacillus* NP5 Against *Aeromonas hydrophila* Infection

Indonesian Aquaculture Journal, 19(1), 2024, 45-56

Catfish *Clarias* sp. is one of the leading commodities in demand and has economic value. Low survival due to cannibalism and disease is the main constrain of *Clarias* sp. hatchery. One of the way to overcome this problem by the application of biofloc supplemented with probiotic *Bacillus* NP5. This study aimed in evaluating the appropriate dose of *Bacillus* NP5 probiotic supplemented to the biofloc system to improve the health status, growth performances, water quality, and resistance to *A. hydrophila*. The catfish fry (*Clarias* sp.) with an average weight of 1.79 ± 0.05 g were reared in tanks with a dimension of $60 \times 30 \times 35$ cm³. The experiment applied a completely randomized design (CRD) consisted of five treatments with three replicates which were negative control (KN), positive control (KP), biofloc without probiotic bacteria (BFT), biofloc supplemented with *Bacillus* NP5 10^4 CFU mL⁻¹ (BFT4), biofloc supplemented with *Bacillus* NP5 10^6 CFU mL⁻¹ (BFT6). Treatments tested were challenged with *A. hydrophila* at density 10^4 CFU mL⁻¹ by immersion, except the negative control. After 40 days of rearing, biofloc supplemented with *Bacillus* NP5 treatments had a significant effect ($P < 0.05$) on growth performance, immune response, water quality, total bacteria in water and the gut compared to the positive control and negative control ($P < 0.05$). In addition, total *A. hydrophila* in liver, kidney and water were lower ($P < 0.05$) in BFT4 and BFT6 treatments than the controls. As the conclusion, the bioflocs supplemented with *Bacillus* NP5 improved the growth performance, immune response and resistance of catfish to *A. hydrophila* infection.

KEYWORDS: *Aeromonas hydrophila*; *Bacillus* NP5; Biofloc; *Clarias* sp.

Mat Fahrur, Dody Dharmawan Trijuno, Zainuddin, Muh Chaidir Undu, Makmur, Imam Taukhid, and Rachman Syah (Faculty of Marine Science and Fisheries, Hasanuddin University, Makassar, Indonesia)
A Study On Aquaponic Cultivation Of Vannamei Shrimp (*Litopenaeus vannamei*) And Water Spinach (*Ipomoea aquatica* Forsk) Under Low Salinity

Indonesian Aquaculture Journal, 19(1), 2024, 57-73

Cultivation waste poses a severe threat to reducing environmental quality. However, the problem of low salinity cultivation waste can be overcome by converting it into plants. This research was conducted to assess the impact of salinity on the growth performance of Vannamei shrimp (*Litopenaeus vannamei*) and water spinach (*Ipomoea aquatica* Forsk) in a low-salinity aquaponic system. Floating raft system for planting water spinach. Furthermore, the role of water spinach in using N and P nutrients from the culture media of vannamei shrimp was analyzed. The experiment was carried out for 35 days, with two treatments and three repetitions, namely 5 and 10 ppt. Salinity affected the growth performance of shrimp and water spinach. Shrimp reared at 10 ppt exhibited higher growth rate, harvest size, and shrimp yield, along with lower feed conversion ratio (FCR) and water use compared to those reared at 5 ppt. Meanwhile, the performance of water spinach at 5 ppt salinity resulted in higher survival, plant height gain, root length gain, number of leaves, and yield of water spinach compared to 10 ppt salinity. The growth performance of water spinach decreased with increasing salinity, and the efficiency in reducing N and P from the 5 ppt culture media was 1.3 times higher than that of 10 ppt. Water spinach showed better results in the 5 ppt salinity media than 10 ppt, while vannamei shrimp grew at 5 ppt. Therefore, 5 ppt salinity was recommended as a suitable condition for integrated cultivation of vannamei shrimp and water spinach in low-salinity aquaponics. Both species were compatible and complemented each other's role in developing low-salinity aquaponics.

KEYWORDS: Aquaponics; aquaculture wastewater; salinity; shrimp vannamei; water spinach

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Wisnu Arya Gemilang, Guntur Adhi Rahmawan, Ruzana Dhiauddin, Koko Ondara, and Ulung Jantama Wisha (Research Institute for Coastal Resources and Vulnerability, Ministry of Marine Affairs and Fisheries)
Land Suitability Modeling For Fishery Resource Enhancement in The Padang Pariaman Regency, West Sumatra, Indonesia: Gis And Multi-Criteria Evaluation Approaches

Indonesian Aquaculture Journal, 19(1), 2024, 75-85

Land suitability analysis is required for successful aquaculture planning. Due to the geographical setting of the Padang Pariaman Regency, aquaculture development is likely hindered by the vulnerable coastal area. The suitability assessment of aquaculture projects is crucial to specify the best method for sustainable development in the study area. This study aims to select the most proper location to be developed as a center of shrimp aquaculture in the Padang Pariaman Regency. This study employed the multi-criteria decision-making (MCDM) and analytical hierarchy process (AHP) approaches, combined with GIS-based analysis to yield the most proper location for aquaculture development. The three sub-models (engineering, water quality, and infrastructure) are overlaid using the weighted linear combination (WLC) technique. The infrastructure sub-model resulted in the highest coverage of highly suitable criteria, with 61.74%. By contrast, the highest percentage of the unsuitable category was found in the water quality sub-model, with 17.67%. Of particular concern, 87.50% of the study area is suitable for aquaculture development. The remaining region is categorized as highly suitable, with 11.93% found in the eastern Padang Pariaman. Thus, we conclude that developing shrimp aquaculture in the study area is possible. Still, the future environmental impacts should be considered beforehand.

e

Mira Mawardi, Agustin Indrawati, Angela Mariana Lusiastuti, and Wayan Teguh Wibawan (IPB University- School of Veterinary Medicine and Biomedical Sciences (SVMBS IPB University) Bogor, Indonesia)
Lactococcus Garvieae: Characterization And Ability To Inhibit The Growth Of Freshwater Aquaculture Pathogenic Bacteria

Indonesian Aquaculture Journal, 19(1), 2024, 87-98

Lactococcus garvieae is a gram-positive ovoid cocci bacterium formerly classified as a member of the *Lactococcus* genus. This study aims to isolate *L. garvieae* from catfish rearing pond and characterize it as a potential probiotic candidate. *L. garvieae* was identified and characterized through phenotypic and genotypic observation, genomic %G~C content analysis, cell surface hydrophobicity assays, acidification test, in vitro antagonism, and a profile of antimicrobial activities. The MT597595.1 accession number corresponds to *L. garvieae*, as determined by a molecular identification test. Biochemical characterization was performed using API 50 CH kit. The genomics %G~C content of *L. garvieae* was 51.8. Findings from acidification ability tests, in vitro antagonism tests, and the ability of bacteria to grow in broth medium at pH 4 reveal that *L. garvieae* can inhibit the growth of *Aeromonas hydrophila*, *Streptococcus agalactiae*, *Streptococcus iniae*, and *Edwardsiella ictaluri*. However, it does not suppress the growth of *L. garvieae Edwardsiella tarda*. Remarkably, *L. garvieae* has the ability to reduce the pH of neutral broth medium turning it acidic. Furthermore, *L. garvieae*'s hydrophobic cell surface exhibited an adhesive, hydrophobic, and protein surface cell content with a compact growth pattern consistent with postive SAT and MATH assay. Antimicrobial activity tests, encompassing 11 antibiotics, disclosed resistance to Nalidixic acid while displaying intermediate sensitivity to Streptomycin and Trimethoprim. In conclusion, *L. garvieae* demonstrates an inhibitory effect on the growth of pathogenic bacteria, underlining its potential as a probiotic candidate.

KEYWORDS: antimicrobial agent; *L. garvieae*; probiotic; pathogenic bacteria

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Gestar Rheido, Mugi Mulyono, and Amelia Sri Wahyuni Lubis (Jakarta Technical University of Fisheries, Indonesia)
Inclusion Effect Of Nucleotide On Growth And Protein Retention In Pacific White Shrimp *Litopenaeus vannamei*

Indonesian Aquaculture Journal, 19(1), 2024, 99-109

The growth of aquaculture in the world is expected to continue to increase. Intensification of vanamei shrimp farming is one of the best possibilities to increase aquaculture production while taking into account the limiting factors. Limited supply, price, and environmental factors are issues in meeting the needs of fish meals in feed. This study aimed to evaluate the effectiveness of nucleotides (NT, Nucleoforce Aqua™, Bioiberica, SAU, Spain) as feed additives produced commercially in optimizing feed formulations from plant-based ingredients in the aquaculture of white shrimp (*Litopenaeus vannamei*). A 60-day growth trial was conducted to evaluate five treatments: Basal-1 with 10% fish meal; Basal-2 with 6% fish meal; Diet-1: 10% fish meal + 0.1% NT ; Diet-2: 8% fish meal + 0.1% NT and Diet-3: 6% fishmeal + 0.1% NT. As a feed additive produced commercially in optimizing feed formulations from vegetable ingredients in the aquaculture of vannamei shrimp *Litopenaeus vannamei*, the concentration of 0.1% nucleotide formulation has been able to provide good results. The growth performance of the tested shrimp was significantly related to the parameters of increasing biomass, final weight (FBW), feed conversion (FCR), feed protein retention, and average daily growth (ADG) ($p < 0.05$) and TGC. The best results is Diet-1 (10% FMNT treatment) with the best protein content of $37.06\% \pm 0.15$, showed the best performance of growth parameters (ADG, FBW, SR, TGC, PER, and RP) and lowest FCR. The addition of 0.1% nucleotide proves that the functional and nutritional properties of NT have many advantages in increasing the growth rate and more efficient protein absorption. Therefore, 0.1% NT can be recommended as a supplement in shrimp feed. So this study explains that the nucleotide addition of 0.1% in the feed provides an affirmative effect on growth performance and protein content parameters of the whole body of white vanamei shrimp.

KEYWORDS: Nucleotide; growth performance; feed analysis; *Litopenaeus vannamei*

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SEND INSTRUCTIONS FOR WRITING AND PUBLISHING ARTICLES OF INDONESIAN AQUACULTURE JOURNAL 2016 (12pt Bold)

I Nyoman Adiasmara Giri^{*)#}, Ketut Sugama^{*)}, Alimuhammad^{***}), and Anang Hari Kristanto^{****})

^{*)} Research and Development Institute for Mariculture, Gondol

^{**)} Center for Fisheries Research and Development, Jakarta

^{***}) Bogor Agricultural University, Bogor

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ABSTRACT (12pt Bold)

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KEYWORDS: Author guidelines; research journal; aquaculture; article template

1. Introduction

Indonesian Aquaculture Journal has a p-ISSN 0215-0883; e-ISSN: 2502-6577 with Accreditation Number: 591/AU2/P2MI-LIPI/03/2015 (period April 2015-April 2018). First published in 2006, with the publication frequency of twice a year, in June and December. (<http://ejournal-balitbang.kkp.go.id/index.php/iaj>) is a peer-reviewed Journal Indonesian Aquaculture accept manuscripts or articles in the field of aquaculture various academics and researchers nationally.

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tific novelty, and the research problem or hypothesis. At the end of the preliminary assessment purposes should be written the article. In the scientific article format is not allowed their review of the literature as well as in the research report, but expressed in previous literature review (state of the art) to demonstrate the scientific novelty of the article.

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Table 1. Response to selection and final mean body weight of the third generation compared to the control population of the African catfish *Clarias gariepinus* at the end of larval rearing, nursery and grow-out phases

Phases	Periods (days)	Final mean body weight (g)		Response to selection	
		Third generation	Control	Gram (g)	Percentage (%)
Larval rearing	25	0.19 ± 0.10	0.19 ± 0.07	-	-
Nursery	30	6.12 ± 2.93	5.80 ± 3.50	-	-
Grow-out	60	198.67 ± 82.82	165.22 ± 71.09	33.45	20.24

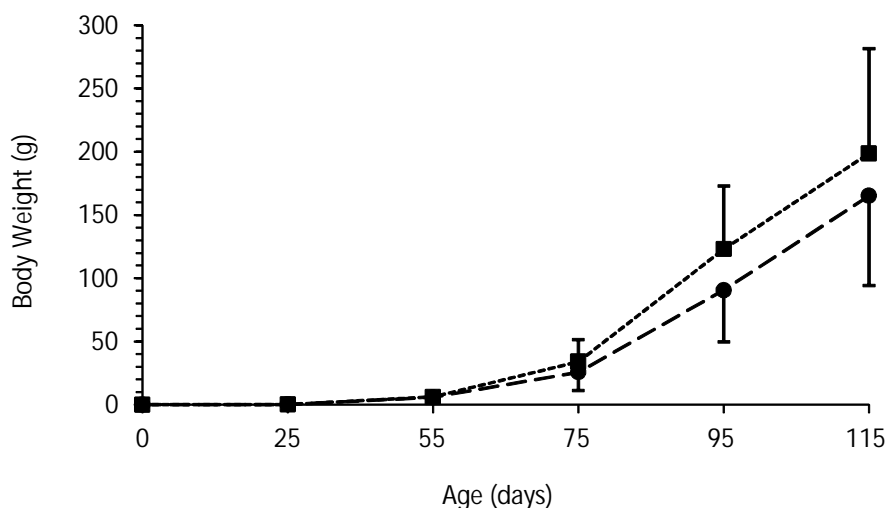


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement program held at Research Institute for Fish Breeding, Sukamandi. Vertical lines represent its each standard deviation

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$$RPS = \left(1 - \frac{\% \text{ fish mortality of vaccinated}}{\% \text{ Fish mortality of control}} \right) \times 100$$

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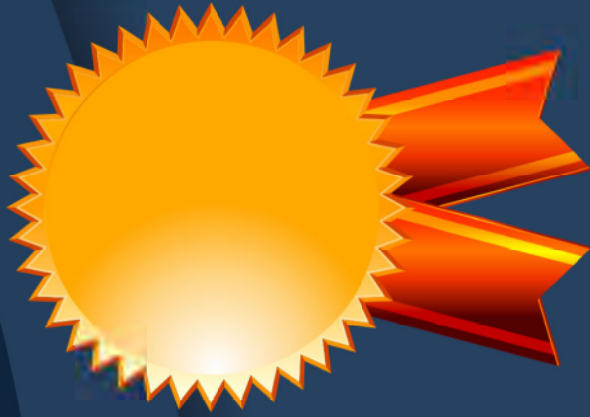
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