

INDONESIAN AQUACULTURE JOURNAL

p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 16 Number 2, 2021

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UDC 639.3.03

Rudhy Gustiano, Vitas Atmadi Prakoso, Kurniawan Kurniawan, and Wahyulia Cahyantiv (Research Institute for Freshwater Aquaculture and Fisheries Extension)

Growth and early reproduction development of the first generation of sheatfish, *Ompok miostoma* (Vaillant, 1902) reared in controlled concrete tanks

Indonesian Aquaculture Journal, 16 (2), 2021, 61-67

This study was conducted to observe the growth and reproductive biology of wild sheatfish in controlled concrete tanks. The research was carried out from January to November 2020 at the Research Station for Freshwater Fisheries Germplasm, Cijeruk, Bogor. Sampled fish were captured from Cilala Lake in Bogor and Cipanas River in Sumedang, West Java. The collected fish were 14.6 ± 2.24 cm in length and 21.5 ± 9.19 g in weight. Growth and reproductive biology parameters were measured every 30 days. Cortisol, estradiol, vitellogenin, testosterone, glucose, and hemoglobin were also determined as the supporting parameters for gonadal maturity. Measured water quality parameters were temperature, pH, dissolved oxygen, ammonia, and alkalinity. The results showed that sheatfish grew with a specific growth rate of $0.4 \pm 0.15\%/day$, FCR of 3.2 ± 0.26 , and survival rate of 100%. Observation on the gonad maturity found that the fish studied were in the level-I and II. There are no significant differences regarding the supporting parameters ($P > 0.05$) on the fish examined, despite the tendency of decreasing cortisol, and increasing testosterone. Based on the results, this study concludes that the observed fish can adapt, grow, and start to mature their gonads in their new environment, with temperature as one of the possible key factors influencing its gonad development.

KEYWORDS: sheatfish; reproductive biology; growth; physiology; domestication

UDC 639.3.034.2

Muslim, Agus Oman Sudrajat, Muhammad Zairin Jr., Muhammad Agus Suprayudi, Arief Boediono, Iis Diatin, and Alimuddin (Aquaculture Study Program, IPB University)

Ovary development FSH and LH genes expression of Indonesian leaffish, *Pristolepis grootii* (Bleeker, 1852), injected with luteinizing hormone-releasing hormone analog

Indonesian Aquaculture Journal, 16 (2), 2021, 69-77

Indonesian leaffish, *Pristolepis grootii* (Bleeker, 1852), is an undomesticated freshwater fish species native to the rivers, flooded swamps, and tributaries of Indonesia. The fish is mainly captured for consumption. In order to prevent its extinction and supply its growing demands, the artificial breeding of the fish should be developed. The purpose of this study was to determine the optimum dose of luteinizing hormone-releasing hormone analog (LHRHa) for stimulating the female *P. grootii* gonadal development at a dosage of 0, 1, 10, and $50 \mu\text{g kg}^{-1}$ of fish. Female fish (20.0 ± 0.6 g) were adapted for 30 days in the rearing environment and then separated into 12 aquariums with six fish per aquarium. Fish were then reared for another 21 days and fed with *Tubifex* sp. The LHRHa injection was conducted twice on day-7 and 14. Fish bodyweight, gonadosomatic index, gonad histology, blood estradiol- 17β , and FSH- α and LH- α gene expression were evaluated at day 0, 7, 14, and 21. The results showed that the injection of the LHRHa hormone stimulated the development of fish gonads and was better achieved with a higher concentration of LHRHa. The best treatment was observed by the administration of $50 \mu\text{g kg}^{-1}$ of LHRHa that produced the fastest development among all treatments. This study demonstrated that the LHRHa induction could potentially stimulate the gonadal development of the newly domesticated fish. To our knowledge, this is the first study that reported the success of the induction of female gonad development in the Indonesian leaffish *P. grootii*.

KEYWORDS: estradiol; gonadotropin; reproduction; *Pristolepis*

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p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 16 Number 2, 2021

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UDC 639.31

Siska Aliyas Sandra, Hasan Nasrullah, Harton Arfah, Muhammad Zairin Jr., and Alimuddin (Faculty of Fisheries and Marine Sciences, Bogor Agricultural University)

Growth and expression pattern of growth-related genes in the fast-growing giant gourami *Osphronemus goramy*
Indonesian Aquaculture Journal, 16 (2), 2021, 79-89

Growth improvement of the giant gourami through molecular assisted selection offers a breakthrough solution regarding the slow growth problem in culturing the fish species. However, gene molecular expression studies and gene mapping information are scarce for this species. This study aimed to evaluate the growth, expression of the growth-related genes and compare the gene expressions between fast-growing (FG) and slow-growing (SG) fish. The polymorphism screenings were also conducted within the GH sequence of the FG and SG populations. Fish growth was analyzed by measuring length and weight once a month. The expression levels of GH, IGF1, AMPK, ARS-I, ALT, and AST genes were analyzed using real-time PCR. Twenty-five days old fish were reared for 30 days. The fish were continuously reared separately based on their body weight (BW) for 85 days until reaching 140 days old. At the end of the rearing period, the BW growth rate of the FG population was 1.569-fold higher, and body length (BL) growth was 1.056-fold higher than the SG population. FG fish have higher gene expression than the SG fish, indicating the important role of gene expression in fish growth. The polymorphisms screening within the GH sequences showed no significant difference between FG and SG fish of giant gourami. These research results provide valuable information in developing the marker-assisted selection for growth traits in giant gourami.

KEYWORDS: gene expression; GH-IGF1 axis; giant gourami; growth; polymorphism

UDC 639.31

Jojo Subagja, Emir Ma'arif Imamudin, Kurniawan Kurniawan, Agoes Soeprijanto, and Yunita Maimunah (Research Institute for Freshwater Aquaculture and Fisheries Extension)

Determining the optimum temperature for growth, feed efficiency and survival of domesticated Indonesian mahseer, *Tor soro* larvae

Indonesian Aquaculture Journal, 16 (2), 2021, 91-97

Temperature plays a pivotal role in the success of larvae production. Evaluation of the effects of different temperatures on growth, feed efficiency, and survival of domesticated Indonesian mahseer (*Tor soro*) larvae was carried out to determine an optimum rearing temperature. Five different temperature settings of 22°C, 24°C, 26°C, 28°C, and 30°C were used as the treatments arranged in triplicates, in indoor closed recirculating systems. The larvae were stocked in a rectangular glass tank with a stocking density of 150 larvae per tank and fed with a commercial feed (30% protein content) three times a day, about 10% per body weight over 61 days of observation. Measured parameters included the specific growth rate of total weight (SGR_{TW}) and length (SGR_{TL}), feed efficiency (FE), and survival rate (SR). The result showed that the treatments of different temperatures significantly affected the growth performance and feed efficiency of the larvae. The growth performance and feed efficiency of mahseer larva were much better at rearing temperature from 24°C to 28°C compared with those at 22°C and 30°C. There were no significant differences in SR in different temperatures tested. The SR was found to range from 86.44% to 100% in all treatments. Maintaining temperature ranging from 24°C to 28°C is the best rearing condition to achieve the optimum growth and feed efficiency of mahseer during the larval rearing period. The findings from this research could be set as a standard technique in larval rearing of Indonesian mahseer (*Tor soro*).

KEYWORDS: rearing temperature; mahseer hatchery; Kancra; Dewa; RAS

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p-ISSN 0215-0883
e-ISSN 2502-6577

Volume 16 Number 2, 2021

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UDC 639.31

Christian Larbi Ayisi, Elliot Haruna Alhassan, Freda Sarfo, and Getrude Mensah Dzifa (Department of Water Resources Development and Sustainable Development, School of Sustainable Development, University of Environment and Sustainable Development Somanya, Eastern Region, Ghana)

Substitution of fish oil with palm kernel oil in diets of *Oreochromis niloticus* fry: effects on growth, feed utilization and economic estimates

Indonesian Aquaculture Journal, 16 (2), 2021, 99-107

This study assessed the impact of replacing fish oil with palm kernel oil (PKO) in the diets of *Oreochromis niloticus* fry on growth, feed efficiency and proximate composition. Three isonitrogenous (30% crude protein) and isolipidic (10% crude lipid) diets were formulated using palm kernel oil as a substitute for fish oil at 0% (PKO-0), 50% (PKO-50), and 100% (PKO-100). Two hundred *O. niloticus* fry with initial weight of 0.80 ± 0.25 g were purchased from Water Research Institute Upper West, Ghana and transported to the Spanish Laboratory of University for Development Studies (Ghana) where they were kept and fed two times a day on commercial diet from Ranaan feed for two weeks. The fry was then stocked in triplicate groups in 60 L tanks (50 cm x 40 cm x 40 cm) at 20 fry per tank. At the end of the eight weeks feeding trial, there was a significant difference amongst the three treatments with respect to final weight, weight gain, feed conversion ratio, and specific growth rate. It was observed that the least mean values for feed intake, protein productive value, protein efficiency ratio, and protein intake occurred in fish fed PKO-0. There was a trend of increasing whole body moisture content as palm kernel oil increased. Fish fed PKO-0 recorded the lowest lipid content ($7.48 \pm 1.13\%$) in the whole body. From the economic analysis, it is evident that palm kernel oil is a cheaper source of lipid for tilapia. This study therefore recommends palm kernel oil as a substitute for tilapia diet.

KEYWORDS: palm kernel oil; economic analysis; growth; tilapia; fish oil

UDC 639.2.091

Ratchaneegorn Mapanao, Wirat Jiwyam, Wilailuk Khruanet, and Nudtha Nithikulworawong (Aquatic Animals Production Technology Program, Faculty of Multidisciplinary Studies, Khon Kaen University, Nong Khai Campus, Nong Khai Province, Thailand, 43000)

Potential applications of dietary *Moringa oleifera* leaves as growth modulator and immunostimulant against *Aeromonas hydrophila* for farmed *Oreochromis niloticus*

Indonesian Aquaculture Journal, 16 (2), 2021, 109-117

Herbal medicine, including moringa (*Moringa oleifera*), is widely used as dietary supplementation to enhance growth performance and increase disease resistance in aquaculture. This study aimed to investigate the effects of supplementing moringa leaves on growth performance, hematology and disease resistance of Nile tilapia (*Oreochromis niloticus*) against *Aeromonas hydrophila*. Fish (38.05 ± 0.83 g) were fed with a commercial feed supplemented by moringa leaves at 0%, 15%, 20%, and 25%, ad libitum, twice a day for eight weeks. Results revealed that 15% moringa leaves supplemented diet gave the highest weight gain, while the specific growth rate was statistically significantly different ($p < 0.05$) among the treatments. Fish fed with 25% supplementation had the highest total red blood cell count and total white blood cell count. All experimental groups had higher values of red blood cells and white blood cells than the control group. The challenge test with *A. hydrophila* showed that the fish fed with the 25% moringa leaves supplementation diet had the highest relative percentage survival rate. There were no significant differences among the treatment groups. However, the treatment groups had a statistically significant difference with the control group ($p < 0.05$). Results of the present study indicated that supplementation of 15% moringa leaves in diet gave optimal growth performance, while supplementation of 25% moringa leaves in the diet showed the best results in terms of the health of Nile tilapia. Moringa leaves supplemented in Nile tilapia diet enhanced growth performance and increased disease resistance against *A. hydrophila*.

KEYWORDS: moringa leaves; *Oreochromis niloticus*; *Aeromonas hydrophila*; hematology

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UDC 639.2.091

Sukenda, Achmad Suhermanto, Muhammad Zairin Jr, Angela Mariana Lusiastuti, Sri Nuryati, and Dendi Hidayatullah (Department of Aquaculture, Faculty of Fisheries and Marine Science, IPB University (Bogor Agricultural University), Bogor Indonesia)

Virulence gene profiling and pathogenicity of *Streptococcus agalactiae* isolated from tilapia, *Oreochromis niloticus* farms in Indonesia

Indonesian Aquaculture Journal, 16 (2), 2021, 119-125

Streptococcosis caused by *Streptococcus agalactiae* has become a major disease problem in tilapia culture in Indonesia. This study aimed to detect virulence genes of *S. agalactiae* during streptococcosis disease outbreaks in several tilapia farms in Indonesia and evaluate the correlation between biotype and virulence genes to bacterial virulence. The presence of virulence genes was determined in 10 strains of *S. agalactiae* isolated from farm-raised tilapia. Polymerase chain reaction (PCR) protocol was used to determine genes for *cylE*, *hylB*, *lmb*, *bib A*, *PI-2b*, *fbs A*, *fbs B*, *gap*, *PI-1*, and *cfb* in the template DNA. Pathogenicity test was carried out by intraperitoneal injection of 24 hour-cultured *S. agalactiae* to tilapia with 10^8 CFU/fish. Four isolates have seven of virulence genes (*cylE*, *hylB*, *bibA*, *PI-2b*, *fbs A*, *fbs B*, and *gap* genes), three isolates have six virulence genes (*hylB*, *bib A*, *fbs A*, *fbs B*, *gap*, *cfb* genes), one isolate has four virulence gene (*hyl B*, *bib A*, *fbs*, and *cfb* genes), and one isolate has one virulence gene (*PI-2b* gene). None of the isolates has *lmb* or *PI-1* genes. Bacteria with more virulence genes showed higher pathogenicity post injection. Mortality of tilapia injected with β -hemolytic bacteria was 100% within the period of 14-19 hours, while non-hemolytic bacteria was 53.3%-86.6% on 14 days post-injection. Pathological changes associated with the infection by either isolate included melanosis, slow response, anorexia, ocular opacity, gasping, erratic, C-shape, and whirling. It can be concluded that *S. agalactiae* with more virulence genes show a higher level of pathogenicity. The presence of a virulent gene has the potential to be used as a basis for selecting candidate isolates and designing vaccine compositions as an effort to prevent streptococcosis infection in tilapia in Indonesia.

KEYWORDS: *Oreochromis niloticus*; pathogenicity; *Streptococcus agalactiae*; virulence genes

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

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

*) Research and Development Institute for Mariculture, Gondol

**) Center for Fisheries Research and Development, Jakarta

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ABSTRACT (12pt Bold)

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

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CONCLUSION: The conclusion describes the response of hypotheses and / or research purposes. Conclusions not contain looping of results and discussion, but rather a summary of the research results.

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

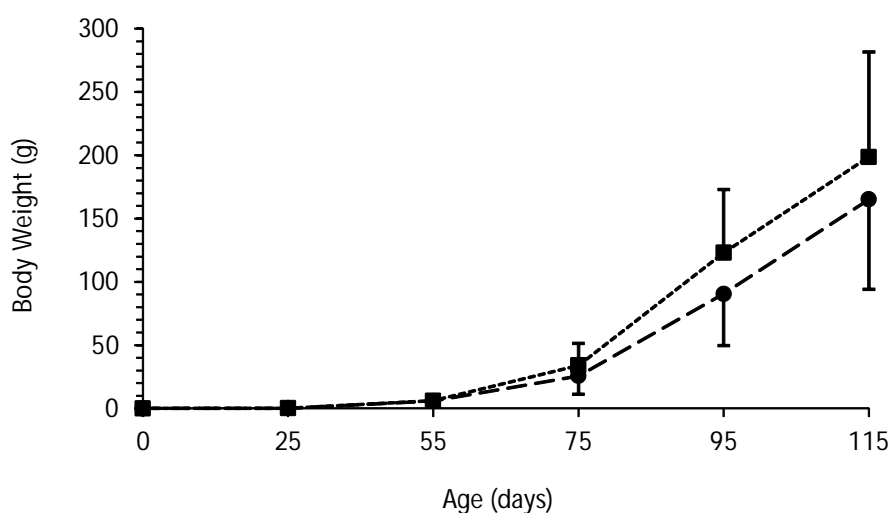


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement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

ACKNOWLEDGEMENTS: thanks mainly devoted to research funders. Acknowledgements can also be delivered to the parties that support the implementation of the research and writing of the manuscript.

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10. Acknowledgements

Thanks delivered to the Center for Fisheries Research and Development, which has funded the sustainability of this journal.

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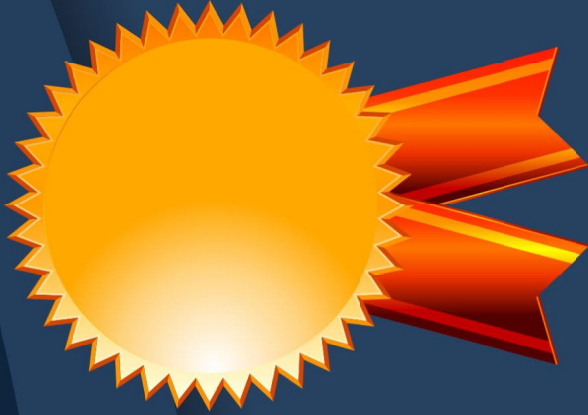
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Petikan dari Keputusan Menteri Riset dan Teknologi/
Kepala Badan Riset dan Inovasi Nasional
Nomor 85/M/KPT/2020
Peringkat Akreditasi Jurnal Ilmiah Periode I Tahun 2020
Nama Jurnal Ilmiah

Indonesian Aquaculture Journal

E-ISSN: 25026577

Penerbit: Pusat Riset Perikanan

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TERAKREDITASI PERINGKAT 1

Akreditasi Berlaku selama 5 (lima) Tahun, yaitu
Volume 14 Nomor 2 Tahun 2019 sampai Volume 19 Nomor 1 Tahun 2024

Jakarta, 01 April 2020
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