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UDC 639.32

Yasmina Nirmala Asih, Sudewi, Afifah Nasukha, Daniar Kusumawati, Ketut Mahardika, Ahmad Muzaki, and I Nyoman Adiasmara Giri (Institute for Mariculture Research and Fisheries Extension)

Optimum density of *Nannochloropsis* sp. for mass larval rearing of coral trout, *Plectropomus leopardus* (Lacepède, 1802)

Indonesian Aquaculture Journal, 15 (2), 2020, 51-58

Coral trout, *Plectropomus leopardus* (Lacepède, 1802)is a visual feeder. Turbidity caused by phytoplankton or clay particle in the water will affect the visual foraging of coral trout larvae. Addition of *Nannochloropsis* sp. has been included in standard operational procedure for marine fish larval rearing as green water. However, the density of *Nannochlorposis* sp. in coral trout larval rearing system has not been evaluated. This study aimed to evaluate the optimal of Nannochloropsis sp. required for rearing of coral trout larvae. *Nannochloropsis* sp. was given to two days old larvae (D-2), with the densities of 2 x $10^5$, 4 x $10^5$, and 6 x $10^5$cell/mL. After 50 days rearing period (D-50), evaluation on the average size and total harvest were recorded. The results showed that the density of 2 x $10^5$ cell/mL *Nannochloropsis* sp. was the best in survival rate (2.35 ± 1.05%) than other densities, but they were not significantly different ($P > 0.05$) than those of 4 x $10^5$ cell/mL (1.67 ± 0.70%) and 6 x $10^5$ cell/mL (1.26 ± 1.05%). The lower densities, 2 x $10^5$ and 4 x $10^5$cell/mL, were dominated by more than 50% of > 2.7 cm sized juvenile. Histological analysis of fish eyes supported that the two lower densities produced dominant cone shape as the receptor cells in the retina observed. From an economical aspect, addition of 2 x $10^5$ cells/mL resulted on the higher profit, hence optimum density of Nannochloropsis sp. added in coral trout larval rearing on a mass scale was 2 x $10^5$ cells/mL.

KEYWORDS: coral trout; larval rearing; *Nannochloropsis* sp.; turbidity

UDC 639.31

Victor Oscar Eyo, Felix Eze, and Ochuko Joshua Eriegha (Department of Fisheries and Aquaculture, Faculty of Marine Environmental Management, Nigeria Maritime University)

Reproductive performance of hatchery-bred, wild-caught broodstock, and their outbreed in the African catfish *Clarias gariepinus* (Burchell, 1822)

Indonesian Aquaculture Journal, 15 (2), 2020, 59-65

This study was conducted to evaluate the reproductive performance of hatchery-bred and wild-caught broodstock of *Clarias gariepinus*. Thirty pairs of each hatchery-bred and wild-caught broodstock (15 females and 15 males) was used for the study. Induced breeding was carried out in four groups with three replications at a ratio of 1:1 by hypophysation method. Group A: hatchery-bred male and hatchery-bred female (HBM m + HBF f); B: wild-caught male and wild-caught female (WCM m + WCF f), C: hatchery-bred female and wild-caught male (HBF f+ WCM m) and D: wild-caught female and hatchery-bred male *C. gariepinus* (WCF f + HBM m). Results showed that egg diameter, sperm motility, sperm density, and male GSI were not significantly different ($P > 0.05$) whereas ovary weight, sperm volume, fecundity, female GSI, and percentage fertilization were significantly higher ($P < 0.05$) in hatchery-bred broodstock than wild-caught broodstock. Hatchability was significantly higher ($P < 0.05$) in Group C and D than A and B. In conclusion, a better reproductive performance in *C. gariepinus* with an economic advantage could be recorded through the combination of wild-caught and hatchery-bred broodstock.

KEYWORDS: fecundity; gonadosomatic index; ovary weight; hatchability; fertilization rate; outbreeding

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Nina Meilisza, Muhammad Agus Suprayudi, Dedi Sujadi, Muhammad Zairin Jr., and I Made Artika (Research Institute for Ornamental Fish Culture)

Effects of synthetic astaxanthin, chlorella, and spirulina supplementation in diets on growth and pigmentation of kurumoi rainbowfish, *Melanotaenia parva*

Indonesian Aquaculture Journal, 15 (2), 2020, 67-75

Several studies have recommended the supplementation of astaxanthin in the Kurumoi rainbowfish diet to enhance its color and growth. However, knowledge regarding the effects of naturally-sourced and synthetically-made carotenoids in fish diets is currently limited. This study's objective was to compare the growth and color performances of *Melanotaenia parva* by supplementing fish feed with synthetic astaxanthin and natural carotenoids sourced from *Chlorella* and *Spirulina*. A total of 12 fish (weight of 1.27 ± 0.02 g and total length of 4.70 ± 0.07 cm) were stocked at a density of one fish per liter. Basal feed (B) was used as the control feed. The experimental feeds were: B added with different doses of synthetic astaxanthin (Carophyll® Pink 10% water-soluble) from low to higher doses as follows: 0.6 g $kg^{-1}$ (AS-L), 2.6 g $kg^{-1}$ (AS-O), and 5.1 g $kg^{-1}$ (AS-H); and B added with natural carotenoids of *Chlorella* sp. (Ch) and *Spirulina* sp. (Sp) of 8.6 g $kg^{-1}$ and 5.5 g $kg^{-1}$, respectively. The experimental diets were given at satiation for 56 days at 8 am and 3 pm. The study results showed that the addition of synthetic astaxanthin at a dose of 2.6 g $kg^{-1}$ could increase the fish growth up to 12% with carotenoid deposition in the fish fin of three times higher than that of the treatments without synthetic astaxanthin. This dose was considered the optimal dose to increase the fish's growth performance and pigmentation compared with the high dose of 5.1 g $kg^{-1}$. Despite having the same nutrient composition, natural carotenoids in *Chlorella* and *Spirulina* did not produce better results compared to the low dose of synthetic astaxanthin of 0.6 g $kg^{-1}$.

KEYWORDS: synthetic carotenoid; *Melanotaenia parva*; optimization; growth; color

UDC 639.512

Rosmiati, Ike Trismawanti, and Samuel Lante (Research Institute for Coastal Aquaculture and Fisheries Extension)

Effect of various cryoprotectants on preservation of black tiger *Penaeus monodon* shrimp spermatozoa

Indonesian Aquaculture Journal, 15 (2), 2020, 77-83

The development of cryopreservation technique on tiger shrimp *Penaeus monodon* broodstock spermatophore has been carried out to support the artificial insemination. This study aims to determine the effect of three cyoprotectants (methanol, dimetylsulphoxide (DMSO), and glycerol) for long term storage of tiger shrimp *Penaeus monodon* spermatozoa. Spermatophores were collected from the wild broodstocks through electrical shock. Spermatozoa were obtained by homogenizing the spermatophores using a Radnoti micro homogenizer in Ca-free saline solution containing one of three cryoprotectans (methanol, dimetylsulphoxide, and glycerol) separately at the concentration of 5%. One mL of each cryoprotectant containing spermatozoa with the density of 1.02 x $10^6$ cell/mL was transferred into a cryovial and cryopreserved at room temperature, -20°C and -196°C for 5, 10, and 30 days. The apparent sperm viability (ASV) of cryopreserved spermatozoa was monitored after treated. Thawing of cryopreserved spermatozoa was carried out in a 30°C wáter bath for two minutes. The result showed that the best apparent sperm viability was obtained at the using of glycerol at -196°C in liquid nitrogen, even after the thirty days of cryopreservation time period with the ASV of 0.82 x $10^6$ cells/mL (80.39%). Meanwhile two other cryoprotectans displayed the ASV of 0.54 x $10^6$ cells/mL (56.86%), and 0.23 x $10^6$ cells/mL (22.55%). for DMSO and methanol, respectively. In turn, the control showed the lowest ASV with the ASV of 0.01 x $10^6$ cells/mL (1.27%). The ASV showed by this glycerol exhibited asignificant difference ($P<0.05$) to that of methanol, DMSO, and control.

KEYWORDS: cryoprotectant; *Penaeus monodon*; spermatozoa; temperature

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UDC 639.2.091

Hamida Pattah, Dinamella Wahjuningrum, Munti Yuhana, and Widanarni (Ambon Sea Aquaculture Fisheries Center)

Control of *Vibrio alginolyticus* infection in asian sea bass *Lates calcarife*r using Ambon banana plant powder *Musa paradisiaca*l through the feed

Indonesian Aquaculture Journal, 15 (2), 2020, 85-91

Asian sea bass is one of economically important commodities in aquaculture. However, its culture often challenged by vibriosis infection which resulted in lower production. The study aimed to evaluate the effectiveness of the ambon banana plant powder application in feed as an effort to control the disease caused by *Vibrio alginolyticus* infection. Asian sea bass with total length of 7.48 ± 0.45 cm. Five different treatments were applied in this experiment, i.e. positive control, negative control, prevention, curative, and antibiotic application. The challenge test is carried out on the 15th day. Challenge test was performed with intramuscularly injection of *V. alginolyticus* at the cell density of $10^6$ CFU/fish. The results showed the amount of feed consumption after the challenge test was highest in the curative and antibiotic control. However, these results were not significantly different ($P>0.05$) among preventive and curative treatments but were significantly different from controls ($P<0.05$). Fish treated with supplemented feed showed the highest total erythrocytes, total leukocytes, hemoglobin, respiratory burst, and lysozyme activity compared to controls. IL-1b gene expression increased after the challenge test with the highest level of expression in the curative treatment. It can be concluded that the administration of ambon banana plant powder (3 g/100 g diet) could control of *V. alginolyticus* infection in Asian sea bass and resulted 70.00% survival rate on prevention and 83.33% on curative treatments.

KEYWORDS: Ambon banana plant powder; Asian sea bass; control; disease; *Vibrio alginolyticus*

UDC 639.2.091

Angela Mariana Lusiastuti, Hessy Novita, Lila Gardenia, Taukhid, and Habil Sven M. Bergmann (Research Institute for Freshwater Aquaculture and Fisheries Extension)

Combination vaccines against koiherpes virus and *Aeromonas hydrophila* co-infection in koi and common carp

Indonesian Aquaculture Journal, 15 (2), 2020, 93-102

Co-infections occur when hosts are infected by two or more pathogens, either simultaneous or as a secondary infection. This research aimed to determine the best compositions of vaccine combinations and their protective efficacies against pathogens co-infection. This research was conducted in two stages. Firstly, surveys were conducted in three research areas: infected, high risk of infection, and virus free areas. Samples (three to five fish per pool) were collected from three fish farms per area. The basic antibody titer of fish from each farm was checked before and after vaccination as well as after the virus challenge in combination with the PCR result. The second stage of the research was conducted in the laboratory. Carp and koi fish were used to determine optimal vaccine combination and dosage for oral application. The results of this research showed that combination of KHV: *Aeromonas hydrophila* vaccines in the ratio of 1:2 and vaccine volume of 3 mL via the oral application gave higher titer antibody and efficacy against KHV and *A. hydrophila*. In conclusion, the combined vaccine offers an effective means of preventing the diseases, decreasing fish mortality, and simplifying the immunization schedule, which will eventually increase the overall health of farmed fish and benefit fish farmers and service extension officers. This research recommends that further development of the combined vaccines should be carried out, for example, overcoming the technical difficulties in its manufacturing.

KEYWORDS: KHV; *Aeromonas hydrophila*; combination vaccine; common carp; koi

## *Author index*

# 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

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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 |

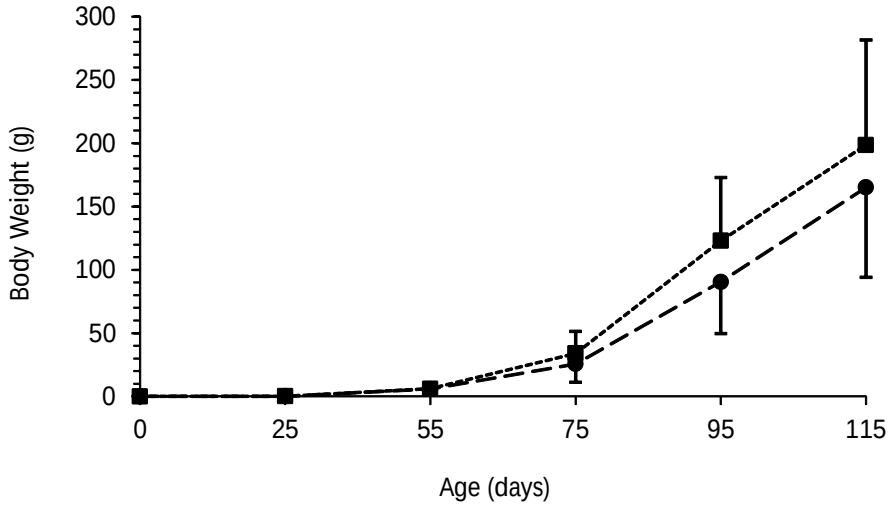


Figure 1. Growth performances based on body weight during 25 days of larval rearing phase, 30 days of nursery phase and 60 days of grow-out phase (based on samplings of 2% populations) of the third generation (■) and control population (●) of the African catfish (*Clarias gariepinus*) genetic improvement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

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

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Bekker, J.G., Craig, I.K., and Pistorius, P.C. (1999). Modeling and Simulation of Arc Furnace Process. ISIJ International, 39 (1), 23-32.

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Roeva, O. (2012). Real-World Applications of Genetic Algorithm. In International Conference on Chemical and Materials Engineering (p. 2530). Semarang, Indonesia: Department of Chemical Engineering, Diponegoro University.

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