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Huria Marnis, Evi Tahapari, and Jadmiko Darmawan (Research Institute for Fish Breeding)

Correlation of microsatellite DNA markers with growth traits in striped catfish (*Pangasianodon hypophthalmus*)

Marker-assisted selection in genetic improvement of striped catfish is useful in the breeding program of the fish. Five microsatellite markers were characterized in the largest (4.03 kg ± 1.67 kg) and smallest (1.41 kg ± 0.22 kg) individuals. Five polymorphic loci were then used to genotype 160 individuals and the associations between their genotypes and growth traits were examined. The result showed that twenty-seven alleles were detected in striped catfish. The number of alleles per locus (N_A) ranged from 4 to 7, with an average of 5.4 alleles per locus. The effective number of alleles per locus (N_E) ranged from 3.940 to 6.939, with an average of 5.32 alleles per locus. H_O and H_E ranged from 0.125 to 0.944 (mean value of 0.472) and from 0.564 to 0.775 (mean value of 0.697), respectively. PIC ranged from 0.573 to 0.799 (mean value of 0.706), showing that they were highly polymorphic loci. Only one microsatellites loci (Pg13) that showed significant differences ($P<0.01$) in the associations between their genotypes and growth traits, while Pg3 and Pg14 were significantly associated with the standard length ($P<0.01$) and body weight ($P<0.05$). However, the Pg1 and Pg2 were not significantly associated with the body weight and standard length. Four genotypes of three loci were positively correlated with the growth traits (body weight and standard length) i.e. genotypes 194/194 for Pg3, 227/227 and 229/229 for Pg13, 279/279 for Pg14. These four genotypes can be used to identify growth traits in the molecular marker-based selection of a breeding program.

KEYWORDS: microsatellite; growth traits; allele; fast-growing; genetic diversity; *Pangasianodon hypophthalmus*

Vitas Atmadi Prakoso and Deni Radona (Institute for Freshwater Aquaculture Research and Fisheries Extension)

Effects of different pH settings on growth and survival of common carp rajadanu strain

pH is one of the important water quality parameters in aquaculture. This study aimed to observe the growth performance and survival rate of common carp (*Cyprinus carpio*) Rajadanu strain reared in culture media with different pH levels. Fish (length: 3.60 ± 0.18 cm; weight: 1.68 ± 0.18 g) were stocked in nine aquariums (40 cm x 40 cm x 30 cm) for 10 days with a stocking density of 25 fish per aquarium. The treatments used were (A) pH 4-5, (B) pH 5-6, and (C) pH 6-7, with three replications. A commercial feed containing 28% protein was given daily and as much as 3% of the total biomass. The observed data were analyzed using variance analysis (ANOVA), followed by Duncan test. The results showed that the pH treatments did not affect the growth (length and weight) and survival rate of common carp Rajadanu strain ($P>0.05$). The best growth was achieved by the fish group reared in water with a pH range of 6-7 (length = 0.38 cm; weight = 0.17 g). The highest survival was attained by the fish group reared in water with a pH range of 5-6 (90.66%).

KEYWORDS: growth; survival; Rajadanu; *Cyprinus carpio*; pH

Haryati, Yushinta Fujaya, and Early Septiningsih (Faculty of Marine Scinces and Fisheries, Hasanuddin University)

The effects of weaning time on the growth and survival of mud crab (*Scylla olivacea*)

Live foods such as rotifers and *Artemia* are commonly used as foods in larval rearing of mud crab (*S. olivacea*). However, the continuous availability and nutritional consistency of live foods are difficult to control. Thus, the development of artificial diets to partially or fully replaced live foods is needed to overcome the limitations of live foods. The purpose of this research was to determine the best stage at which mud crab larvae can be weaned from live foods to artificial diets. The research experiment consisted of: treatment-1, the larvae were fed with live foods from zoea-1 to megalopa stages as the control treatment; treatment-2, the larvae were fed with artificial diet from zoea-2 to megalopa stages; and treatment-3, the larvae were fed with artificial diet from zoea-3 to megalopa stages. In treatment-4, artificial diet was given from zoea-4 to megalopa stages. The growth and survival rate of larvae in treatment-1, 3, and 4 were not significantly different ($P > 0.05$) but significantly different with treatment-2. Based on the present results, this study suggests that artificial diet can be given to mud crab larvae (*S. olivacea*) from the third zoea stage.

KEYWORDS: artificial diet; larvae; live foods; *S. olivacea*; weaning period

Wa Iba, Michael A. Rice[)], Lucie Maranda, and Gary H. Wikfors (Faculty of Fisheries and Marine Science, University of Halu Oleo)

Growth characteristics of newly isolated Indonesian microalgae under different salinity

The aim of this study was to investigate growth characteristics of the new microalgae strains isolated from Kendari Bay and the Wanggu River estuary, Indonesia. Isolates denoted as Kb1-2, Kb1-3, Kb1-5, and Kb2-6 were established to evaluate their growth under controlled conditions. A batch culture experiment of these strains except Kb2-6 was conducted for 15 days under salinity levels of 20, 25, 30 and 35 gL^{-1}. *Tetraselmischui*, *Tisochrysislutea* and *Chaetocerosneogracile* were used to compare growth with Indonesian isolates. Cell numbers were measured every other day and cell size was measured from 50 live cells during the logarithmic phase. Cell sizes of three of the four Indonesian microalgae ranged from 1.2-11.8 μm, considered suitable for shrimp larvae. Indonesian strains started the logarithmic phase of growth at all salinities tested from 0 to 3 days after inoculation except Kb1-3 that started after a 3-day lag. Increasing cell density over culture period and division rate of Indonesian microalgae during logarithmic phase of growth were similar at all salinities tested, similar to *T. chui*, *Ti. lutea* and *C. neogracile*. However, final biomass after 15 days of culture of all microalgal strains was affected by culture salinities tested. Indonesian microalgal strains showed similar dry weight and ash free dry weight to smaller-cell strains, *Ti. lutea* and *C. neogracile*. Indonesian strains (other than Kb2-6) may be good candidates for mass culture in shrimp hatcheries based upon their cell size, ability to survive long culture periods, and wide salinity tolerance.

KEYWORDS: microalgae; shrimp; aquaculture; Indonesia

UDC 639.043.2

Mulyasari, Mas Tri Djoko Sunarno, and Lusi Herawati Suryaningrum (Institute for Freshwater Aquaculture Research and Fisheries Extension)

Isolation, characterization, and identification of proteolytic bacteria to improve protein digestibility of fish feed ingredients

Protease is one of the potential enzymes used to improve the quality of local raw materials as fish feedstuff. The aim of this research was to find high protease activity-bacteria isolates in improving protein digestibility of fish feedstuff. Isolation was conducted on various growth substrates such as water and sediment of hot springs, mangrove sediment, and shrimp head waste. The parameters used in the selection and characterization of potential proteolytic bacteria were qualitative and quantitative tests of proteolytic activity. Microbes that have the highest enzyme activity were then selected and characterized based on their growth curve, production time of protease, and determination of optimum condition (temperature and pH) of protease activity. The result showed that there are only 18 isolates from 44 isolates positively had protease activity (qualitatively). Three isolates with the highest activity (RGL1.1, PL1.1, and PL1.2) qualitatively and quantitatively were then selected to be tested for their pathogenecity on tilapia. The results showed that only RGL1.1 was not pathogenic and therefore, potentially used as a protease producer candidate. The characterization of RGL1.1 isolates showed that the exponential phase of RGL1.1 was thirty-sixth hour in line with the optimum activity of enzyme production. The optimum pH and temperature of RGL1.1 isolate were 6 and 50°C, respectively. RGL1.1 isolate is a Gram-positive rod-shaped bacteria that has 99.53% of resemblance to *Bacillus cereus*.

KEYWORDS: proteolytic bacteria; isolation; characterization; identification

UDC 639.512

Nurbaya and Muharijadi Atmomarsono (Research Institute for Coastal Aquaculture and Fisheries Extension)

Use of different probiotics for prevention of vibriosis disease on tiger shrimp larvae reared in fiberglass tanks

To counter disease problems caused by vibriosis in shrimp hatchery, this recent study used three different probiotics to be tested on tiger shrimp (*Penaeus monodon*) postlarvae. The study arranged four treatments as follows: A: a combination of three liquid-form probiotics *Brevibacillus laterosporus* BT951, *Bacillus subtilis* BM12, and *B. licheniformis* BM58; B: a combination of three powder-form probiotics *Brevibacillus laterosporus* BT951, *Bacillus subtilis* BM12, and *B. licheniformis* BM58; C: a commercial powder probiotic containing *Bacillus subtilis*; and D: control (without probiotic), each treatment with three replications. This study was set up in a completely randomized design experiment using twelve fiberglass tanks filled with 750 L sterile sea water and stocked with 30,000 nauplii in the Awarange shrimp hatchery of the Research Institute for Brackishwater Aquaculture and Fisheries Extension Installation in Barru. Variables observed in this study were the survival rate of the shrimp postlarvae at the end of the experiment, total vibrio count (TBV) and total plate count of common bacteria (TPC) in the culture water. The results showed that the survival rate of tiger shrimp applied either in liquid (A: 61.5±4.7%) or powder form (B: 48.6±6.8%), and control (without probiotic) (D: 51.2±4.4%) were not significantly different (P>0.05). However, survival rates in these three treatments differed (P<0.05) with that of the commercial probiotic (C: 21.7±9.9%). TBV/TPC ratio in the tank waters treated with the commercial probiotic (2.26-37.52%) was much higher than that of the liquid form probiotic (0.86-1.98%), powder form probiotic (1.25-8.37%), and control (1.93-2.84%). Ammonia-nitrogen in treatment C (1.462-2.989 mg/L) was relatively higher than that of in treatment A (1.595-2.435 mg/L), treatment B (1.644-2.115 mg/L), and treatment D (1.051-1.858 mg/L).

KEYWORDS: probiotic; survival rate; tiger shrimp postlarvae; vibriosis

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

**) Center for Fisheries Research and Development, Jakarta

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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

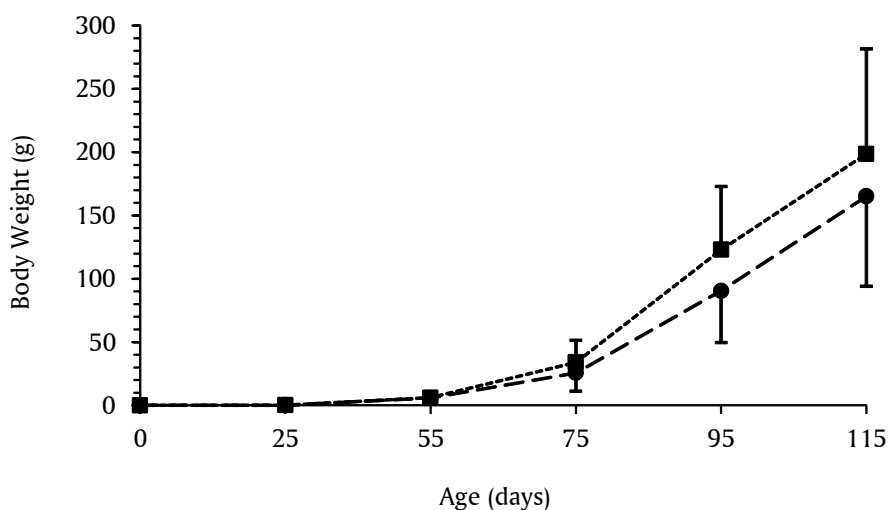| Phases	Periods (days)	Final mean body weight (g)		Response to selection	
		Third generation	Control	Gram (g)	Percentage (%)
Larval rearing	25	0.19 ± 0.10	0.19 ± 0.07	-	-
Nursery	30	6.12 ± 2.93	5.80 ± 3.50	-	-
Grow-out	60	198.67 ± 82.82	165.22 ± 71.09	33.45	20.24

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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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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