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Kata kunci bersumber dari artikel. Lembar abstrak dapat dicuplik tanpa izin dan biaya

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The effect of mixed animal-vegetable oils in feed on early gonadal maturation of male Asian redbtail catfish (*Hemibagrus nemurus*)

*Pengaruh kombinasi minyak hewani dan nabati dalam pakan terhadap pematangan gonad awal ikan baung (*Hemibagrus nemurus*) jantan*

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Male broodstock candidates of Asian redbtail catfish tend to have aggressive behaviour due to excessive testosterone production, which is exacerbated by poorly-regulated high-cholesterol feeding practices. This study aimed to suppress these conditions by administering the dietary combination of animal and plant-based oils during pre-gonadal maturation of male broodstock candidates (BW: 215.83±41.28 g; BL: 272.12±19.89 mm), reared in a 2 × 1 × 1 m³ net cage with the stocking density of two fish per cage. This study was conducted using a completely randomized design with three dietary combination treatments (2% of each oil dosage) with four replicates: base feed with no mixed dietary oil (K), mixed fish oil-maggot oil (IM), and mixed fish oil-palm oil (IS). All parameters, namely reproductive performance (final length/Pt, final weight/Wt, feed intake/FI, gonadosomatic index/GSI, and hepatosomatic index/HSI) and blood chemistry profile (total cholesterol/TC, high-density lipoprotein/HDL, triglycerides/TG, and glucose/GLU), were statistically tested their significance using the analysis of variance and Duncan's multiple range test with 95% confidence level. Significant differences were found in Pt and Wt ($p < 0.05$), where the dietary combination of oils (IM-IS) showed higher Pt and Wt values than the dietary without the mixed oils (K). The IM treatment obtained the highest TG level (159.98±38.44 mg dL⁻¹; $p < 0.05$), yet showed no significant differences from the other treatments in TC, HDL, and GLU levels ($p > 0.05$). This study concludes that the dietary combination of fish oil (2%)-maggot oil (2%) improves lipid deposition during pre-gonadal maturation and regulates energy storage through weight gain, without jeopardizing the somatic growth (length) of male Asian redbtail catfish broodstock candidates.

KEYWORDS: broodstock; catfish; diets; oil; pre-maturation

Calon induk ikan baung jantan memiliki sifat agresif yang salah satunya disebabkan produksi testosteron berlebih akibat pemberian pakan dengan kadar tinggi kolesterol. Penelitian ini ditujukan untuk mengurangi dampak tersebut melalui evaluasi kombinasi minyak hewani dan nabati pada pakan selama fase awal kematangan gonad calon induk ikan baung jantan (BW: 215,83±41,28 g; BL: 272,12±19,89 mm), yang dipelihara pada hapa ukuran 2 × 1 × 1 m³ dan padat tebar sebesar dua ekor ikan per hapa. Penelitian ini menggunakan rancangan acak lengkap dengan tiga perlakuan pakan kombinasi (dosis tiap minyak 2%) dan empat ulangan, yaitu pakan tanpa kombinasi (K), pakan dengan kombinasi minyak ikan-maggot (IM), dan minyak ikan-sawit (IS). Seluruh parameter, yaitu kinerja reproduksi (panjang akhir/Pt, bobot akhir/Wt, total konsumsi pakan/FI, indeks somatik gonad /GSI, dan indeks somatik hati / HSI) dan profil kimia darah (total kolesterol/TC, high-density lipoprotein/HDL, trigliserida/TG, dan glukosa/GLU), dianalisis menggunakan analisis sidik ragam dan uji jarak berganda Duncan dengan derajat kepercayaan 95%. Perbedaan nyata ditunjukkan pada Pt dan Wt ($p < 0,05$), dimana kombinasi minyak IM-IS menunjukkan nilai Pt dan Wt yang lebih tinggi dibandingkan tanpa pemberian kombinasi minyak (K). Perlakuan IM memperoleh konsentrasi TG tertinggi (159,98±38,44 mg dL⁻¹; $p < 0,05$), namun menunjukkan tidak adanya perbedaan nyata terhadap perlakuan lainnya pada konsentrasi TC, HDL, dan GLU. Penelitian ini menyimpulkan, bahwa kombinasi minyak ikan (2%) dan minyak maggot (2%) mampu memperbaiki penyimpanan lemak untuk fase awal kematangan gonad (trigliserida dalam serum darah) dan mendorong penyimpanan energi melalui peningkatan bobot, tanpa mengganggu pertumbuhan somatik (panjang) dari calon induk ikan baung jantan.

KATA KUNCI: ikan baung; induk; kematangan gonad; minyak; pakan

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Kata kunci bersumber dari artikel. Lembar abstrak dapat dicuplik tanpa izin dan biaya

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Effect of fermented fig flour (*Ficus racemosa* L.) substitution on protein and lipid retention in giant gourami (*Osphronemus goramy* Lacepede, 1801)

Pengaruh substitusi tepung buah Ara (*Ficus racemosa* L.) fermentasi terhadap tetensi protein dan lemak ikan gurami (*Osphronemus goramy* Lacepede, 1801)

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Ficus racemosa is one plant species that can be used as a substitute for soybean meal in giant gourami feed. Substitution of fermented fig flour with Effective Microorganisms 4 (EM-4) can improve protein quality in feed and the growth of giant gourami. The objective of this study was to analyze the effect of feeding giant gourami with fig flour-based substitute feed on protein and lipid retention values in aquaculture systems. The method used was an experiment in a completely randomized design with five treatments (0%, 10%, 20%, 30%, 40% fermented fig flour) and five replicates. The feed formulation was prepared using the five isonitrogenous method with a protein content of 32%. The fermentation of fig flour was carried out aerobically, incubated for 72 hours using EM-4. The test fish used were 250 giant gourami weighing between 15 and 20 g. Feeding was carried out at 07:00 and 17:00 WIB with a dose of 3% of the fish biomass. Giant gourami fish were kept for 70 days, with length and weight measurements taken every 14 days. The results showed that treatment F4, with 30% fermented fig flour in the feed, had the highest protein retention ($18.41 \pm 0.86\%$) and lipid retention ($36.03 \pm 1.60\%$) in giant gourami. Treatment F4, with 30% fermented fig flour in the artificial feed, was the best treatment for producing effective and efficient protein and lipid retention values in giant gourami.

KEYWORDS: *Ficus racemosa*; retention; protein; lipid; fermentation; giant gourami

Ficus racemosa adalah salah satu jenis tumbuhan yang dapat digunakan sebagai pengganti tepung kedelai dalam pakan ikan gurami. Substitusi tepung buah ara yang difermentasi dengan EM-4 dapat meningkatkan kualitas protein dalam pakan dan pertumbuhan ikan gurami. Tujuan penelitian ini adalah menganalisis pengaruh pemberian pakan pengganti berbasis tepung buah ara pada nilai retensi protein dan lemak dalam sistem budidaya perikanan. Metode yang digunakan adalah eksperimen dengan desain acak lengkap yang terdiri dari lima perlakuan (0%, 10%, 20%, 30%, 40% fermentasi tepung buah) dan lima ulangan. Formulasi pakan disiapkan menggunakan metode isonitrogenus dengan kandungan protein 32%. Fermentasi tepung buah ara dilakukan secara aerobik, diinkubasi selama 72 jam menggunakan EM-4. Ikan uji yang digunakan adalah 250 ekor ikan gurami dengan bobot berkisar 15-20 g. Pemberian pakan dilakukan pada pukul 07:00 dan 17:00 WIB dengan dosis 3% dari biomassa ikan. Ikan gurami dipelihara selama 70 hari, pengukuran panjang dan bobot ikan diukur setiap 14 hari. Hasil menunjukkan bahwa perlakuan F4, dengan 30% tepung buah ara fermentasi dalam pakan, memiliki retensi protein ($18,41 \pm 0,86\%$) dan retensi lemak ($36,03 \pm 1,60\%$) tertinggi pada ikan gurami. Perlakuan F4 dengan 30% tepung buah ara fermentasi dalam pakan buatan merupakan perlakuan terbaik untuk menghasilkan nilai retensi protein dan lemak yang efektif dan efisien pada ikan gurami.

KATA KUNCI: *Ficus racemosa*; retensi; protein; lemak; fermentasi; ikan gurami

Kata kunci bersumber dari artikel. Lembar abstrak dapat dicuplik tanpa izin dan biaya

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Modelling dissolved oxygen in intensive aquaculture systems: linear regression vs random forest approaches

Pemodelan oksigen terlarut dalam sistem budidaya intensif: pendekatan regresi linier vs random forest

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Dissolved oxygen (DO) is a critical water quality parameter in intensive aquaculture systems because its fluctuations directly affect farmed fish. Accurate prediction of DO is challenging due to complex, often nonlinear interactions among physicochemical and biological variables. Despite increasing interest in machine learning applications, comparative evaluations between traditional linear models and ensemble-based approaches in aquaculture contexts remain limited. This study aimed to analyse key variables associated with DO dynamics, compare the predictive performance of linear regression (LR) and random forest (RF) models, and identify dominant predictors relevant to aquaculture management. A publicly available aquaculture water quality dataset from Mendeley Data was analysed. Data were preprocessed by outlier removal and normalization, then split into training (70%) and test (30%) sets, and model robustness was assessed using 5-fold cross-validation. Dissolved oxygen concentrations ranged from 0.21 to 10.17 mg L⁻¹ (mean = 5.19 mg L⁻¹). Pearson correlation analysis showed positive associations between DO and ammonia ($r = 0.60$), biochemical oxygen demand ($r = 0.55$), and nitrite ($r = 0.52$), and negative associations with hydrogen sulphide ($r = -0.55$) and turbidity ($r = -0.53$). These relationships reflected indirect, management-mediated effects rather than direct causation. The RF model slightly outperformed LR ($R^2 = 0.515$ vs. 0.470), demonstrating the advantage of non-linear modelling. The feature importance analysis identified ammonia, hydrogen sulphide, nitrite, and biochemical oxygen demand as the dominant predictors. Although predictive accuracy remained moderate, the results highlight key drivers of DO variability and support the use of machine learning as a decision-support tool for smart aquaculture management.

KEYWORDS: dissolved oxygen; intensive aquaculture; linear regression; machine learning; random forest; water quality modelling

Oksigen terlarut (dissolved oxygen = DO) merupakan parameter kualitas air yang sangat penting dalam sistem akuakultur intensif karena fluktuasinya secara langsung memengaruhi komoditas yang dibudidayakan. Prediksi DO yang akurat menjadi tantangan karena adanya interaksi yang kompleks dan sering kali bersifat nonlinier antara variabel fisikokimia dan biologis. Meskipun minat terhadap penerapan machine learning terus meningkat, evaluasi komparatif antara model linier tradisional dan pendekatan berbasis ensemble dalam konteks akuakultur masih terbatas. Penelitian ini bertujuan untuk menganalisis variabel-variabel utama yang berkaitan dengan dinamika DO, membandingkan kinerja prediktif model regresi linier (LR) dan random forest (RF), serta mengidentifikasi prediktor dominan yang relevan untuk pengelolaan akuakultur. Dataset kualitas air akuakultur yang tersedia secara publik dari Mendeley Data dianalisis dalam penelitian ini. Data diproses melalui penghapusan pencilan dan normalisasi, kemudian dibagi menjadi data training (70%) dan pengujian (30%), dengan ketahanan model dievaluasi menggunakan validasi silang lima lipatan. Konsentrasi DO berkisar antara 0,21 hingga 10,17 mg L⁻¹ (rata-rata = 5,19 mg L⁻¹). Analisis korelasi Pearson menunjukkan hubungan positif antara DO dan amonia ($r = 0,60$), kebutuhan oksigen biokimiawi (BOD; $r = 0,55$), serta nitrit ($r = 0,52$), dan hubungan negatif dengan hidrogen sulfida ($r = -0,55$) dan kekeruhan ($r = -0,53$). Hubungan tersebut mencerminkan efek tidak langsung yang dimediasi oleh praktik pengelolaan, bukan hubungan kausal langsung. Model RF menunjukkan kinerja yang sedikit lebih baik dibanding LR ($R^2 = 0,515$ vs. 0,470), yang menegaskan keunggulan pemodelan nonlinier. Analisis kepentingan fitur mengidentifikasi amonia, hidrogen sulfida, nitrit, dan kebutuhan oksigen biokimiawi sebagai prediktor dominan. Meskipun akurasi prediksi masih tergolong moderat, hasil penelitian ini menyoroti faktor-faktor utama yang memengaruhi variabilitas DO dan mendukung penerapan machine learning sebagai alat pendukung keputusan dalam pengelolaan akuakultur cerdas.

KATA KUNCI: akuakultur intensif; machine learning; oksigen terlarut; pemodelan kualitas air; random forest; regresi linear

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Screening and enzymatic–biochemical characterization of probiotic candidate bacteria isolated from the digestive tract of lake toba Nile tilapia (*Oreochromis niloticus*)

Skrining dan karakterisasi secara enzimatik–biokimia bakteri kandidat probiotik yang diisolasi dari saluran pencernaan ikan nila (Oreochromis niloticus) Danau Toba

Jurnal Riset Akuakultur, 20(4), 2025, 355-367

Intensive Nile tilapia (*Oreochromis niloticus*) culture in floating net cages in Lake Toba has increased organic waste accumulation due to uneaten fish feed, contributing to water quality degradation, eutrophication, and mass fish mortality. Probiotics are considered a potential solution to improve feed digestibility to mitigate eutrophication and high concentration of dissolved organic matter. However, information on indigenous probiotic bacteria from the digestive tract of tilapia cultured in Lake Toba is limited, particularly regarding their enzymatic and biochemical characteristics. This study aimed to isolate, screen, and characterize enzyme-producing bacteria from the digestive tract of Lake Toba Nile tilapia as early probiotic candidates. Bacterial isolation was performed using serial dilution and culture on tryptic soy agar, followed by purification and morphological characterization. Enzymatic screening for amylolytic, proteolytic, and lipolytic activities was conducted using substrate-specific agar media, and selected isolates were identified using biochemical tests. Seven bacterial isolates were obtained, of which three exhibited extracellular enzymatic activity. Two isolates showed proteolytic activity with clear-zone diameters ranging from 17.4 ± 0.7 to 22.6 ± 0.7 mm, while one isolate demonstrated amylolytic activity with a clear-zone diameter of 1.57 ± 0.5 mm. No lipolytic activity was detected. Based on morphological and biochemical characteristics, the enzyme-producing isolates were identified as belonging to the genera *Micrococcus*, *Staphylococcus*, and *Streptococcus*. These results indicate that the digestive tract of Lake Toba Nile tilapia harbors indigenous enzyme-producing bacteria with potential as probiotic candidates. Further molecular identification, safety evaluation, and *in vivo* assessment are required prior to their application in aquaculture.

KEYWORDS: Lake Toba; mass mortality; organic waste; probiotic; tilapia

Budidaya ikan nila (*Oreochromis niloticus*) secara intensif dalam sistem keramba jaring apung di Danau Toba telah meningkatkan akumulasi limbah organik akibat adanya pakan yang tidak termakan, sehingga berkontribusi terhadap penurunan kualitas perairan, eutrofikasi, dan terjadinya kematian ikan secara massal. Probiotik dipandang sebagai salah satu solusi potensial untuk meningkatkan pencernaan pakan untuk mitigasi terjadinya eutrofikasi dan tingginya konsentrasi bahan organik terlarut. Namun, informasi mengenai bakteri probiotik indigenous yang berasal dari saluran pencernaan ikan nila yang dibudidayakan di Danau Toba masih terbatas, khususnya terkait karakteristik enzimatik dan biokimianya. Penelitian ini bertujuan untuk mengisolasi, menyeleksi, dan mengkarakterisasi bakteri penghasil enzim dari saluran pencernaan ikan nila Danau Toba sebagai kandidat probiotik tahap awal. Isolasi bakteri dilakukan menggunakan metode pengenceran bertingkat dan penanaman pada media tryptic soy agar, diikuti dengan pemurnian dan karakterisasi morfologi. Skrining aktivitas enzimatik meliputi aktivitas amilolitik, proteolitik, dan lipolitik menggunakan media agar dengan substrat spesifik, sedangkan isolat terpilih diidentifikasi melalui uji biokimia. Sebanyak tujuh isolat bakteri berhasil diperoleh, dengan tiga isolat menunjukkan aktivitas enzim ekstraseluler. Dua isolat menunjukkan aktivitas proteolitik dengan diameter zona bening berkisar antara $17,4 \pm 0,7$ hingga $22,6 \pm 0,7$ mm, sedangkan satu isolat menunjukkan aktivitas amilolitik dengan diameter zona bening sebesar $1,57 \pm 0,5$ mm. Aktivitas lipolitik tidak terdeteksi. Berdasarkan karakteristik morfologi dan biokimia, isolat penghasil enzim tersebut diidentifikasi berasal dari genus *Micrococcus*, *Staphylococcus*, dan *Streptococcus*. Hasil ini menunjukkan bahwa saluran pencernaan ikan nila Danau Toba mengandung bakteri indigenous penghasil enzim yang berpotensi sebagai kandidat probiotik. Identifikasi molekuler lebih lanjut, evaluasi keamanan, dan pengujian *in vivo* diperlukan sebelum aplikasinya dalam sistem akuakultur.

KATA KUNCI: Danau Toba; ikan nila; kematian masal; limbah organik; probiotik

Kata kunci bersumber dari artikel. Lembar abstrak dapat dicuplik tanpa izin dan biaya

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Respon pertumbuhan dan sintasan larva ikan tuna sirip kuning (*Thunnus albacares*) terhadap perlakuan warna dinding bak yang berbeda

*Growth and survival response of yellowfin tuna (*Thunnus albacares*) larvae-juvenile to different tank wall color treatments*

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Penelitian ini dilatarbelakangi oleh tingginya mortalitas larva hingga fase juvenil pada pemeliharaan larva tuna sirip kuning, terutama akibat kanibalisme dan tabrakan larva/benih dengan dinding wadah. Studi sebelumnya menunjukkan bahwa warna gelap meningkatkan sintasan larva, sementara warna terang mengurangi kematian pada fase juvenil, namun belum ada pendekatan yang menggabungkan kedua kondisi tersebut. Penelitian ini bertujuan mengevaluasi pengaruh perubahan warna dinding bak pemeliharaan terhadap pertumbuhan dan sintasan larva hingga fase benih. Dua perlakuan dalam penelitian ini : (A) dinding bak berwarna hitam pada fase larva (D-0–D-15) kemudian diubah menjadi putih pada fase juvenil awal (D-16–D-30), dan (B) dinding bak tetap hitam sepanjang pemeliharaan sebagai kontrol. Penelitian dilakukan tiga ulangan dengan rancangan acak lengkap (RAL). Larva dipelihara dalam bak beton berkapasitas 6 m³ dengan padat tebar 90.000 telur per bak, diberi pakan bertahap berupa rotifer, naupli kopepoda, larva kerapu, larva bandeng, hingga nener bandeng, serta dikelola dengan manajemen kualitas air sesuai standar hatchery tuna. Hasil penelitian menunjukkan bahwa warna dinding bak tidak memengaruhi pertumbuhan larva, namun berpengaruh signifikan terhadap sintasan. Perlakuan B (bak hitam sepanjang pemeliharaan) menghasilkan sintasan lebih tinggi pada D-30 ($0,36 \pm 0,06\%$) dibandingkan perlakuan A ($0,20 \pm 0,01\%$) dengan $p < 0,05$. Sementara itu, respon pertumbuhan menunjukkan tidak beda nyata. Secara keseluruhan, penggunaan dinding bak berwarna hitam selama seluruh periode pemeliharaan memberikan sintasan larva-benih yang lebih baik dibandingkan kombinasi perubahan warna. Hal ini menunjukkan bahwa kondisi visual lingkungan yang lebih gelap lebih sesuai untuk mengurangi stres dan mortalitas larva tuna sirip kuning sepanjang fase awal kehidupannya.

KATA KUNCI: larva; pertumbuhan; sintasan; *Thunnus albacares*; tuna sirip kuning; warna wadah

This study was motivated by the high mortality rate of yellowfin tuna larvae rearing during the transition to the early juvenile stage, mainly due to cannibalism and collision with tank walls. Previous studies have shown that dark colors increase larval survival, while light colors reduce mortality in the juvenile phase, but there has been no approach that combines the two conditions. This study aims to evaluate the effect of color changes in the walls of the care tub on the growth and survival of larvae to the seed phase. Two treatments in this study : (A) black tank walls during the larval phase (D-0–D-15) followed by white walls during early juvenile rearing (D-16–D-30), and (B) continuously black tank walls throughout rearing as the control. The study was conducted with three replications using a completely randomized design (RAL). Larvae were reared in 6 m³ concrete tanks stocked with 90,000 eggs per tank and fed gradually with rotifers, copepod nauplii, grouper larvae, milkfish larvae, and milkfish fry, supported by standard hatchery water-quality management. The results showed that tank wall color did not significantly affect larval growth but had a significant effect on survival. Treatment B (black walls throughout rearing) produced a higher survival rate at D-30 ($0,36 \pm 0,06\%$) compared with Treatment A ($0,20 \pm 0,01\%$) with $p < 0.05$. Meanwhile, the growth response shows no real difference. Overall, maintaining fully black tank walls throughout the rearing period yielded better larval-to-seed survival, indicating that a darker visual environment reduces stress and mortality in early life stages of yellowfin tuna.

KEYWORDS: larvae; growth; survival rate; yellowfin tuna; *Thunnus albacares*; tank color

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Pengaruh pemberian larutan teh hitam (*Camellia sinensis*) dengan dosis dan waktu perendaman berbeda terhadap daya rekat telur ikan lele lokal (*Clarias batrachus*)

The effect of black tea (Camellia sinensis) solution with different doses and immersion times on the egg adhesiveness of walking Catfish (Clarias batrachus)

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Riset ini dilakukan untuk mengkaji dampak perendaman telur ikan lele lokal (*Clarias batrachus*) dalam larutan teh hitam (*Camellia sinensis*) dengan takaran serta durasi yang bervariasi terhadap proporsi telur melekat, proporsi fertilisasi, proporsi penetasan, dan kelangsungan hidup larva. Pelaksanaan riset berlangsung pada 5–10 Mei 2025 di Laboratorium Pembenihan dan Pemuliaan Ikan, Fakultas Perikanan dan Kelautan, Universitas Riau, Indonesia. Pendekatan yang diterapkan dengan rancangan acak lengkap faktorial dengan dua faktor, meliputi takaran larutan teh hitam (0, 6, 8, dan 10 g L⁻¹) serta durasi perendaman (2, 4, dan 6 menit), masing-masing dengan tiga ulangan sehingga menghasilkan 36 unit percobaan. Parameter yang dicermati mencakup proporsi telur melekat, telur tidak melekat, proporsi fertilisasi, proporsi penetasan, kelangsungan hidup, serta mutu air. Temuan riset memperlihatkan bahwa variasi takaran dan durasi perendaman berdampak nyata terhadap keseluruhan parameter yang dicermati ($p < 0,05$). Kombinasi optimal untuk proporsi telur melekat dijumpai pada takaran 10 g L⁻¹ selama 6 menit (W6D3), sementara untuk derajat fertilisasi, proporsi penetasan, dan kelangsungan hidup, capaian terbaik diraih pada takaran 10 g L⁻¹ selama 4 menit (W4D3). Dosis 10 g L⁻¹ merupakan konsentrasi paling efektif untuk seluruh parameter, dengan waktu perendaman 4 menit lebih optimal bagi keberhasilan pembuahan, penetasan, dan sintasan larva, sedangkan 6 menit lebih sesuai untuk menurunkan persentase telur merekat. Perbedaan ini menunjukkan bahwa perendaman terlalu lama dapat menurunkan kualitas fisiologis telur meskipun efektif menurunkan persentase telur merekat ikan lele lokal.

KATA KUNCI: daya rekat; ikan lele lokal; tanin; teh hitam

*This study aimed to determine the effect of immersing local catfish (*Clarias batrachus*) eggs in black tea (*Camellia sinensis*) solution at different dosages and immersion durations on the percentage of adhesive eggs, fertilization percentage, hatching percentage, and larval survival rate. The study was conducted from 5 to 10 May 2025 at the Hatchery and Fish Breeding Laboratory, Faculty of Fisheries and Marine Sciences, Riau University, Indonesia. A factorial completely randomized design was applied with two factors: black tea solution doses (0, 6, 8, 10 g L⁻¹) and immersion times (2, 4, and 6 minutes), each with three replicates, resulting in 36 experimental units. The observed parameters included the percentages of adhesive and non-adhesive eggs, fertilization and hatching percentages, survival rate, and water quality. The results showed that different dosages and immersion durations had a significant effect on all observed parameters ($p < 0.05$). The best treatment for the percentage of adhesive eggs was obtained at a concentration of 10 g L⁻¹ with an immersion time of 6 minutes (W6D3). Meanwhile, the highest fertilization rate, hatching rate, and larval survival rate were achieved at a concentration of 10 g L⁻¹ with an immersion time of 4 minutes (W4D3). The 10 g L⁻¹ concentration was the most effective for all parameters. An immersion time of 4 minutes was more optimal for fertilization success, hatching, and larval survival, whereas a 6-minute immersion was more effective in reducing egg adhesiveness. These differences indicate that excessively long immersion durations may reduce the physiological quality of eggs, although they are effective at reducing egg adhesiveness in local catfish.*

KEYWORDS: adhesiveness; black tea; tannin; walking catfish

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AUTHOR GUIDELINES OF JURNAL RISET AKUAKULTUR FOR WRITING FORMAT AND PUBLICATION PROCESS

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ABSTRACT

Abstract is written in bahasa and English using 12-point Times New Roman single space with justified alignment. English abstract is followed by the English version of the title which is typed using bold capitalized each word letters. Abstract must not exceed than 250 words and contains the brief outline of the problem statement and aims of the study, brief methodology, the main findings or results, and conclusion.

KEYWORDS: author guidelines; Jurnal Riset Akuakultur; publication process; writing format

ABSTRAK: *Panduan Format Penulisan Jurnal Riset Akuakultur (Terjemahan dari Judul Artikel yang ditulis dalam Bahasa Indonesia Maksimal 20 Kata)*

Abstrak ditulis dalam bahasa Indonesia dan Inggris menggunakan font Times New Roman 12 spasi satu dengan rata kiri dan kanan. Abstrak bahasa Inggris diikuti dengan judul naskah versi bahasa Inggris yang diketik tebal dengan huruf pertama kapital pada setiap kata. Abstrak tidak boleh lebih dari 250 kata dan berisi ringkasan masalah dan tujuan penelitian, metodologi singkat, temuan utama atau hasil penelitian, dan kesimpulan.

KATA KUNCI: *format penulisan; Jurnal Riset Akuakultur; petunjuk penulisan; proses publikasi*

INTRODUCTION

Introduction must be concise and at least has several components including an adequate background related to the research, problem statement, some literature review from previous studies, the research gap, and the aims of the study. Introduction is written using double space line, single column, 12-point Times New Roman with justified alignment. Text citation of references uses author-date style according to APA 7th Edition and multiple references are listed in alphabetical order separated by semicolon among references to differentiate citations, e.g. (Smith & Jones, 2016; Williams, 2014). Use “and” when giving a citation in sentences and “&” for parentheses, e.g. Smith and Jones (2016) or (Smith & Jones, 2016).

MATERIALS AND METHODS

This section presents a clear and concise research procedures for others to be able to replicate the study. The use of subsections is allowed to explain some different continued-procedures. This section also provides ethical clearance statement for the research which applies an experiment on animals or human. The materials and equipment used must be mentioned with their specifications consisting of the trademark, supplier or manufacture name, and region or country. This section also covers a brief narration about data analysis. Methods that have been published should be summarized and completed with in-text-citation. Modified methods should be clearly described its modification from the previous cited methods. Use the international system of units (SI) or SI-derived units to express unit of measurements. Minus index is suggested being used rather than using slash (/), e.g.: mg L⁻¹, g L⁻¹, not mg/L or g/L. This section is typed in 12-point Times New Roman, double space line, a single column with justified alignment.

RESULTS AND DISCUSSION

Results and discussion must be combined in one section. The statement of the results can be summarized from the data appeared in the figures and tables. Discussion should explore the significance of the results or comparison to previous studies and represent the causal factors why and how the results were taken place, do not re-express the mentioned data in figures and tables in the form of sentences within results. Figures and tables can be placed in this section completed with cross-reference of the figures or tables stated in the text. This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

Tables and figures must be placed within the main text, those can be placed in sections of materials and methods or results and discussion (if applicable). The preparation of tables can follow the guidance below:

1. Provide an editable form of tables, do not place any tables in the form of images.
2. The titles of tables should be consecutively numbered using Arabic numerals, please cite the tables in the text or give cross-reference of tables in the text.
3. The titles of tables are written in both in bahasa and English for the manuscript written

in bahasa, or only in English for the manuscript in English. Type the title using 12-point Times New Roman, single space with sentence case letters in justified alignment, and give hanging indent for the second and consecutive lines of the table title.

4. The body of the table is typed in 10-point Times New Roman, single space with left alignment, only column headings are typed in bold.
5. Please provide bahasa and English versions of any text in the body of the table for the manuscript submitted in bahasa, use italic font to type the English version of the text, while all the text in the table body of the manuscript submitted in English is only provided in English.
6. Use single horizontal lines to separate column heading and to indicate the end of the table, other horizontal lines are not needed. Vertical lines should not be used in the tables.
7. Capitalize only the first letter of the first word in each column and row entry.
8. All abbreviations and symbols or any statistical explanation and used literatures in the table body must be described in footnotes placed below the table and written in 10-point Times New Roman, single space in justified alignment.

An example of table format can be seen below.

Table 1. Average of survival rate, absolute weight growth, absolute length growth, and daily growth rate Asian redtail catfish fry fed different percentages of fermented sago dregs and anchovy head meal feed.

<i>Treatments</i>	<i>SR (%)</i>	<i>AWG (g)</i>	<i>ALG (cm)</i>	<i>DGR (% day⁻¹)</i>
P1	56,67 ± 22,5	0,12 ± 0,01 ^b	1,47 ± 0,39	0,57 ± 0,06 ^b
P2	58,33 ± 10,4	0,11 ± 0,01 ^b	1,42 ± 0,54	0,56 ± 0,03 ^b
P3	75,00 ± 10,0	0,16 ± 0,01 ^c	1,54 ± 0,17	0,78 ± 0,06 ^c
P4	66,67 ± 25,6	0,07 ± 0,00 ^a	1,20 ± 0,07	0,32 ± 0,01 ^a

Note: Values with different superscript letters in the same column indicate significantly different results ($P < 0,05$). P1 = Feeding with percentages of 6%, P2 = 8%, P3 = 10 %, P4 = 12% from body weight of fish fry. SR = survival rate; AWG = absolute weight growth; ALG = absolute length growth; DGR = daily growth rate.

The preparation of figures should refer the guidance below:

1. Figures should be provided in either vector art formats (Illustrator, EPS, WMF, FreeHand, CorelDraw, PowerPoint, Excel, etc.) or bitmap formats (Photoshop, TIFF, GIF, JPEG, etc.). Bitmap images should be of 300 dpi resolution. Provide an editable form of charts, not as images.

2. The titles of figures should be consecutively numbered using Arabic numerals, please cite the figures in the text or give cross-reference of figures in the text.
3. The titles of figures are written in both in bahasa and English for the manuscript written in bahasa, or only in English for the manuscript in English. Type the title using 12-point Times New Roman, single space with sentence case letters in justified alignment, and give hanging indent for the second and consecutive lines of the table title. Place the figure title below the figure.
4. Please provide bahasa and English versions of any text in the body of the figure for the manuscript submitted in bahasa, use italic font to type the English version of the text, while all the text in the figure body of the manuscript submitted in English is only provided in English.
5. Capitalize only the first letter of the first word in any text contained in the figure body.
6. All abbreviations and symbols or any statistical explanation and used literatures in the figure body must be described in footnotes placed below the figure title and written in 10-point Times New Roman, single space in justified alignment.

An example of figure format is presented below.

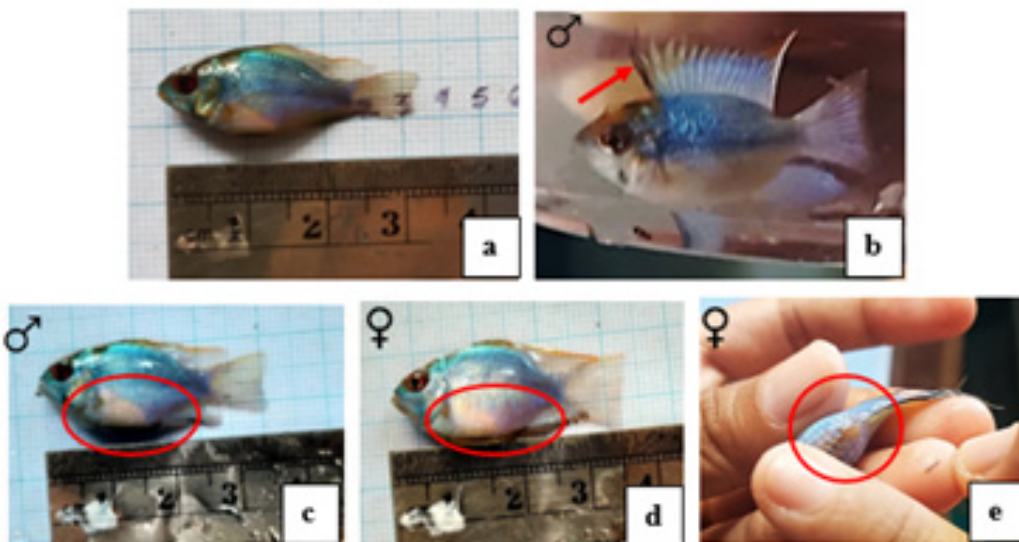


Figure 1. Visual observations of gonad matured ramirezi broodstock: (a) research start (b) ramirezi male at the end of the research with a black elongated front dorsal fin (c) ramirezi male with a bluer body and belly (d) ramirezi female with a pink belly (e) prominent and yellow urogenital.

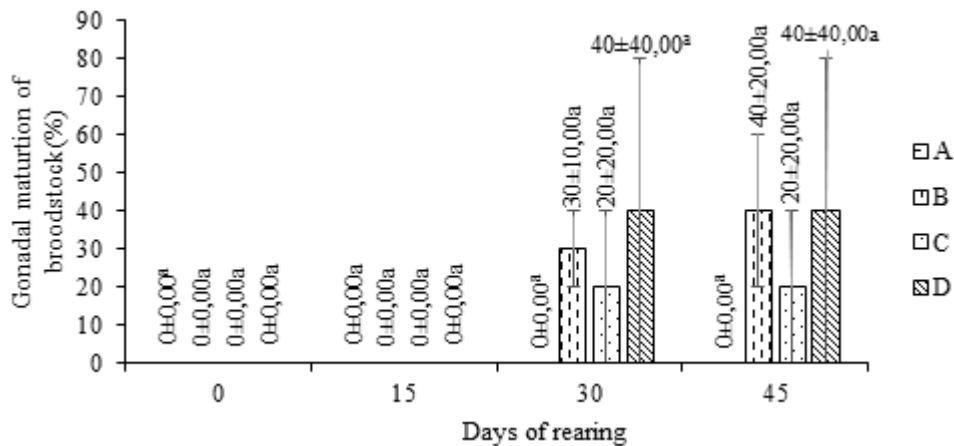


Figure 2. Accumulation percentage of gonadal mature ramirezi broodstock after treatments (combined ratio of artificial feed to bloodworms (*Chironomus* sp.): (A) 3:0, (B) 0:3, (C) 2:1, and (D) 1:2)) on day 0 to day 45

Note: The results presented are based on data normalization. Different superscripts in the same days of rearing indicate significant differences at a confidence level of 95% ($P < 0.05$).

CONCLUSION

Conclusions must summarize the results and answers the research questions or aims. Conclusions should be combined with the summary of the discussions which explains why or how the highlighted results obtained. This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

ACKNOWLEDGMENTS

This section is used to acknowledge any institutions or individuals that provide funding sources or help during the study. The research which was funded by a research grant must mention the name of research grant and its detail such the funding organization and associated grant number (if applicable). This section is written in 12-point Times New Roman, double space line, a single column format with justified alignment.

REFERENCES

- Acciari, M. (2014). The Italianization of Bollywood cinema: Ad hoc films. *Studies in European Cinema*, 11(1), 14-25. <https://doi.org/10.1080/17411548.2014.903099>
- American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.).

- Davies, G., Lam, M., Harris, S. E., Trampush, J. W., Luciano, M., Hill, W. D., Hagenaars, S. P., Ritchie, S. J., Marioni, R. E., Fwan-Ritchie, C., Liewald, D. C. M., Okely, J. A., Aholla-Olli, A. V., Barnes, C. L. K., Bertram, L., Bis, J. C., Burdick, K. E., Christoforou, A., DeRosse, P., ... Deary, I. J. (2018). Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function. *Nature Communications*, 9, Article 2019. <https://doi.org/10.1038/s41467-018-04362-x>
- Devaraj, M. (2007). Nutrition management in nursing homes. In J. E. Morley & D. R. Thomas (Eds.), *Geriatric nutrition* (pp. 323-340). Taylor & Francis. <https://doi.org/10.1201/9781420005493>
- DeWit, S. C., & O'Neill, P. A. (2014). *Fundamental concepts and skills for nursing* (4th ed.). Elsevier.
- Duckworth, A. L., Quirk, A., Gallop, R., Hoyle, R. H., Kelly, D. R., & Matthews, M. D. (2019). *Cognitive and noncognitive predictors of success. Proceedings of the National Academy of Sciences, USA*, 116(47), 23499-23504. <https://doi.org/10.1073/pnas.1910510116>
- Ellis, R. (2012). *Language teaching research and language pedagogy*. Wiley-Blackwell. <https://doi.org/10.1002/9781118271643>
- Liu, L., Zhang, M., Lin, Y., & Qin, L. (2014). A survey on workflow management and scheduling in cloud computing. In P. Balaji, I. Forster, X.-H. Sun, K. W. Cameron, & D. S. Nikolopoulos (Eds.), *2014 14th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing* (pp. 837-846). IEEE. <https://doi.org/10.1109/CCGrid.2014.83>
- Marra, A. R., & Edmond, M. B. (2014). New technologies to monitor healthcare worker hand hygiene. *Clinical Microbiology and Infection*, 20(1), 29-33. <https://doi.org/10.1111/1469-0691.12458>
- Queensland Health. (2014). *Lyssavirus in bats prompts reminder not to touch the animal: Care and treatment* (Report 432). <https://www.health.qld.gov.au/news/stories/140313-lyssavirus.asp>
- SPRINT Research Group. (2015). A randomized trial of intensive versus standard blood-pressure control. *New England Journal of Medicine*, 33(22), 2103-2116. 2116. <https://doi.org/10.1056/NEJMoa1511939>
- Trenbert, K. E., Miller, K., Mearns, L., & Rodes, S. (2000). *Effects of changing climate on human activities*. University Science Books. <http://www.cgd.ucar.edu/staff/trenbert/books/ChangingClimate.pdf>
- Wilson, N. J., Cordier, R., & Wilkens-Gillan, S. (2014). Men's Sheds and mentoring programs: Supporting teenage boys' connection with school. *International Journal of Men's Health*, 13(2), 92-100. <https://doi.org/10.3149/jmh.1302.92>
- Zambrano-Vazquez, L. (2016). *The interaction of state and trait worry on response monitoring in those with worry and obsessive-compulsive symptoms* [Doctoral dissertation, University of Arizona]. UA Campus Repository.



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